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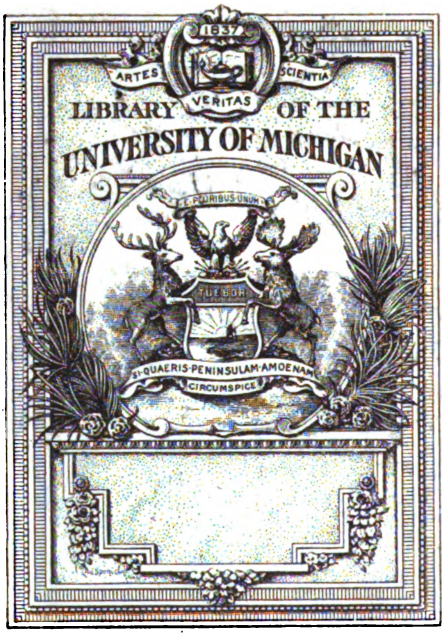
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ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY

BROOKLYN, N.Y.

VOLUME II.

1880.

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ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

CEREBRAL ANATOMY,

WITH SPECIAL REFERENCE TO THE FORM OF THE CORPUS STRIATUM.*

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THE anatomy of the brain is complicated in its details, but the general plan of its construction is simple enough. It consists of two kinds of nervous matter, namely, the white and the gray. The gray matter is arranged in two main divisions, occupying two different localities. These divisions comprise: First, the exterior convolutions, forming the cortex of the brain and spread out upon its surface; and, secondly, the interior cerebral ganglia, situated at its base, and known as the corpus striatum and optic thalamus. The white matter, on the other hand, is derived from a continuation of the longitudinal columns of the spinal cord, which pass upward through the medulla oblongata to the cerebral ganglia, and then continue their course to terminate in the convolutions.

Before going farther, I would recall a few well-known particulars in regard to the course of these ascending fibres of the white substance. After passing through the medulla oblongata, and as they emerge from the upper border of the pons Varolii, they are arranged in oblique bundles, and form the crura cerebri. The crus cerebri on each side at once meets with the gray matter of the cerebral ganglia. It passes through and between these ganglia, in the form of a fan-shaped expansion known as the internal capsule, and then from their upper borders it spreads out into a radiating crown of diverging fibres, called the corona radiata. The fibres of the corona radiata disperse from that point in every direction—forward, backward, inward, and outward—and so reach at last the gray matter of the convolutions.

---

* Delivered before the Society October 25th, 1879.

I suppose this is the simplest statement that can be given of the structure of the encephalon. If we add its connection with the spinal cord and nerves, we shall have a sort of schedule of the whole cerebro-spinal system. In the cerebro-spinal system, counting from without inward, there are three principal deposits or centres of gray matter:

1st. The gray matter of the spinal cord, extending upward on the floor of the fourth ventricle, and around the aqueduct of Sylvius, forming what is known as the gray matter of the medullary canal.

2d. The cerebral ganglia at the base of the brain; and,

3d. The convolutions of the hemispheres.

There are also three sets of fibres, forming the white substance:

1st. The nerves and nerve-roots, connecting the external organs with the gray matter of the medullary canal.

2d. The fibres connecting the gray matter of the medullary canal with the cerebral ganglia; and,

3d. Those uniting the cerebral ganglia with the convolutions of the cortex.

Thus between the cerebral convolutions, as a nervous centre, and the external organs there are two intermediate stations of gray matter, namely, the cerebral ganglia, and the gray matter of the medullary canal; and when a nervous impulse passes from the convolutions to the external organs, or *vice versa*, there are also three successive sets of nerve fibres to take part in its transmission.

The ideas now in vogue as to the anatomy of the nervous system are mainly based on this arrangement. Of course there are other important features also; but they are comparatively secondary, and we need not stop to discuss them now. If we take the views of Luys, of Meynert, of Huguenin, and their followers, and divest them of all superfluous nomenclature, this is the principal idea which they contain: A cerebro-spinal system composed of successive stations of gray matter, connected with each other and with the periphery by successive sets of nerve fibres. Of the three stations of gray matter enumerated above, the middle one is formed by the so-called cerebral ganglia; that is, the optic thalamus and corpus striatum.

In regard to situation, both these ganglia are placed on about the same level and near the base of the brain; but the optic thalamus is situated somewhat farther back, the corpus striatum farther forward. There is also a difference in their physical aspect. In the optic thalamus the white fibres are mingled intimately with the gray substance, so that it presents a nearly uniform light gray color throughout. But in the corpus striatum the fibres run through the gray matter in distinct bundles till near its outer border, so that it has a visible striation of alternate gray and white, distinct enough to justify its name.

The corpus striatum is also divided into two parts. One of them is the *intra-ventricular* portion, visible from the lateral ventricle, the part seen in ordinary horizontal sections of the brain at this level. It has a bulging anterior extremity or head, and a slender posterior continuation, like a tail. From this circumstance it is called the "caudate nucleus" of the corpus striatum. The other part is the *extra-ventricular* portion. It is not visible from the lateral ventricle, but is imbedded in the substance of the brain. In some planes of section it shows a tolerably regular lens-like figure, and is therefore called the "lenticular nucleus." According to this nomenclature the optic thalamus is a separate and complete ganglion by itself; while the corpus striatum consists of two portions, namely, an intra-ventricular portion, or the caudate nucleus, and an extra-ventricular portion, or the lenticular nucleus. But of late it has become customary to confine the name "corpus striatum" to the intra-ventricular or caudate portion, while the other part is known simply as the "lenticular nucleus."

Consequently the corpus striatum and the lenticular nucleus, for the greater part of their extent, are two separate masses. But there is one place where they are united; that is, at their anterior and lower portion. At that point the gray matter is continuous, and the union of the two bodies can be seen perfectly well in sections made at the proper level. Everywhere else the corpus striatum and the lenticular nucleus are separated from each other by the fan-shaped mass of white substance ascending from the crus cerebri. This portion of white substance, running upward and outward, between the corpus striatum and the lenticular nucleus, is known as the "*internal capsule.*" Now, if we examine the relation of the parts in this region, we shall see that the optic thalamus and the corpus striatum are both on the inside and above the internal capsule, while the lenticular nucleus is on the outside and below it. Near the base of the brain, the internal capsule does not reach quite so far forward as the head of the corpus striatum; and it is on this account that a band of gray matter exists here, connecting the corpus striatum with the lenticular nucleus, while everywhere above and behind this point the internal capsule intervenes between them. In a transverse and vertical section of the brain, about the middle of its length, this disposition of the parts is easily seen.

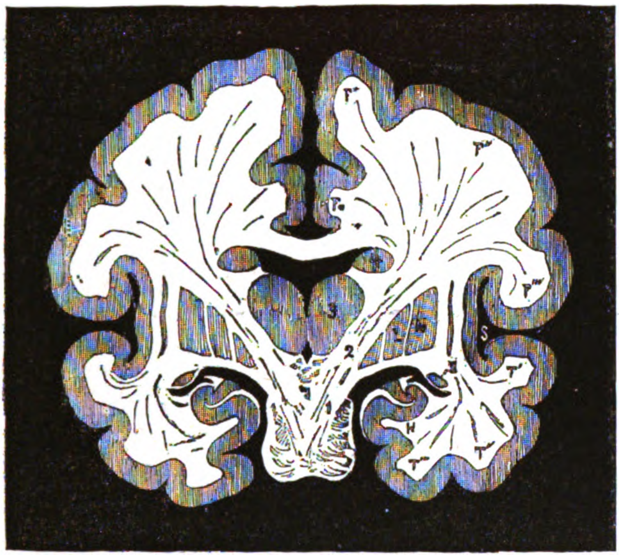

FIG. I.—DIAGRAM OF BRAIN IN TRANSVERSE VERTICAL SECTION.

1. Crus cerebri.
2. Internal capsule.
3. Optic thalamus.
4. Corpus striatum.
5. Surcingle.

c. c. Corpus callosum.
L. N. Lenticular nucleus.
S. Fissure of Sylvius.
Fo. Gyrus fornicatus.
F'. First frontal convolution.
F''. Second frontal convolution.
F'''. Third frontal convolution.
T'. First temporal convolution.
T''. Second temporal convolution.
T'''. Third temporal convolution.
H. Gyrus hippocampi.

We cannot say that the internal capsule consists entirely of the same fibres running continuously through it, from the crus cerebri below to the hemisphere above. On the contrary, there is a strong belief among anatomists that it is formed mainly of a succession of different fibres—those coming from below leaving the capsule to penetrate the cerebral ganglia; while others originate from the ganglia, and thence run upward, through the capsule, to the hemisphere. Still, this interchange of fibres, between the capsule and the ganglia, is not visible to the naked eye. In an ordinary section of the fresh brain, the internal capsule has the appearance of a continuous tract of white substance; and there is no doubt that, as a whole, it is the channel of nervous communication between the cerebral convolutions above, and the medulla and spinal cord below.

The next point to be noticed is this: In the anatomical construction of the hemisphere all its other parts are grouped around the crus cerebri and the internal capsule.

This is very evident in the configuration of the cortex. If we look at the brain of a carnivorous animal, such as the fox, we see that its surface is marked by a few simple and parallel fissures and convolutions. There is one very constant and deeply-marked fissure, the fissure of Sylvius, running from the base of the brain upward and backward, between the frontal and temporal lobes. All the convolutions on the convexity of the hemisphere are grouped around this fissure, running upward and backward from the front, curving round its extremity, and then returning downward and forward to the lower end of the temporal lobe. The entire hemisphere looks as though it were folded, with all its convolutions, about a transverse axis running from side to side, through the bottom of the fissure of Sylvius.

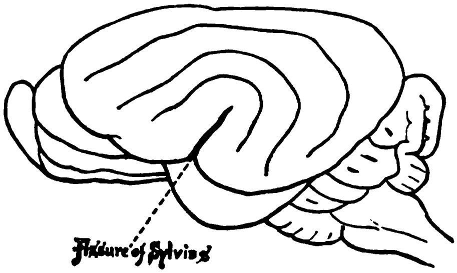

FIG. 2.—BRAIN OF FOX; PROFILE VIEW.

In the human brain the fissure of Sylvius is equally distinct, and it is easy to see the same general arrangement of the convolutions running round its upper extremity. The three frontal convolutions pass upward and backward on the convexity of the hemisphere, and the three temporal convolutions run downward and forward, as in the fox, beneath the fissure of Sylvius. But in the human brain, as compared with that of the animal, there are two new features. In the first place, the fissure of Sylvius is double. There is an anterior branch and a posterior branch, and included between them is a triangular-shaped portion known as the "operculum." Secondly, in addition to the fissure of Sylvius, and above it in position, there is another deep fissure, running in a nearly vertical direction from above downward, on the side of the hemisphere. This is the fissure of Rolando. It is accompanied by two convolutions having a similar direction, one of them in front of it and one behind, the "anterior and posterior central convolutions." The fissure, with its accompanying convolutions, seems to cut across the general direction of the curvature nearly at right angles, and consequently to introduce a certain degree of confusion into the plan of the cerebral hemisphere. But this is only an appearance. It is due simply to the greater development, in man, of the cortical substance.

At the bottom of the Sylvian fissure, on the side of the human brain, there is a group of five short, diverging convolutions, known as the *Insula*, or the "Island of Reil." Internally it corresponds exactly with the outer surface of the lenticular nucleus, and it is that part of the cortex of the brain which is in the most immediate proximity to the cerebral ganglia. Externally it is concealed from view, because that portion of the cerebral hemisphere included between the two branches of the Sylvian fissure projects downward from above, and overhangs it like a cover. It is for that reason this portion is named the "operculum;" and when the two branches of the Sylvian fissure are opened, and the operculum between them lifted up, the insula, with its convolutions, is exposed at the bottom of the cavity.

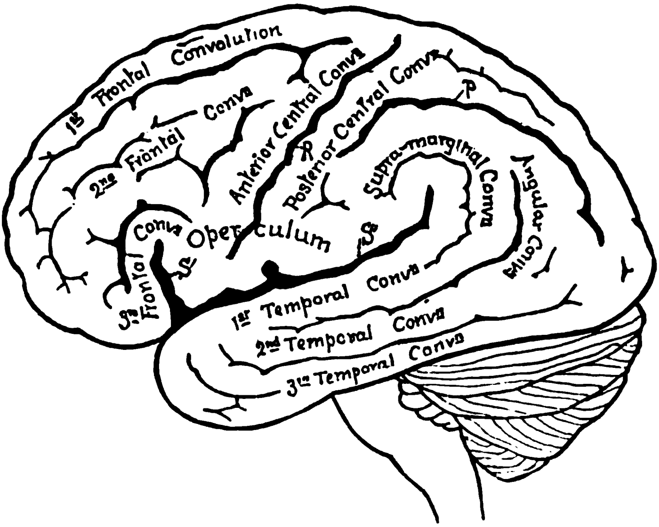

FIG. 3.—HUMAN BRAIN; PROFILE VIEW.

S′. Fissure of Sylvius, anterior branch. R. Fissure of Rolando.
S″. Fissure of Sylvius, posterior branch. P. Interparietal fissure.

It is evident, therefore, that the fissure of Rolando is not really an interruption to the general run of the convolutions. In the fox the fissure of Sylvius is single, and the convolutions are folded upon themselves only once. But in man the fissure of Sylvius is double, and the convolutions are folded upon themselves twice. The development of the cortex in the human brain is so great that different parts of it overlap each other. The operculum hangs down over the insula. The longitudinal convolutions, instead of running in a continuous curve from before backward, make, about the middle of their course, an additional crook. They turn downward along the anterior branch of the Sylvian fissure, and again upward along its posterior branch. In that way they form the operculum. The anterior and posterior central convolutions are the parts immediately folded upon each other in this downward angular bend; and the dividing line between them is the fissure of Rolando.

Now, if we open the great longitudinal fissure and look at the median surface of the hemisphere, we again see the general arched form of its convolutions. Fig. 4 shows the median surface of the right hemisphere, the cavity of the lateral ventricle, and the corpus callosum divided by a longitudinal section. A little above the corpus callosum is an important longitudinal fissure—the *fissura calloso-marginalis.* It runs for some distance parallel with the upper border of the corpus callosum, and then turns upward, in an ascending branch, to the upper border of the hemisphere. In the occipital portion is the *fissura parieto-occipitalis*, directed obliquely downward and forward, and the *fissura calcarina*, nearly horizontal. These two fissures meet in front at an acute angle, and include between them a wedge-shaped lobule, the *cuneus.* In front of the cuneus is a quadrangular lobule, the *præcuneus*, bounded behind by the fissura parieto-occipitalis, and anteriorly by the ascending branch of the fissura calloso-marginalis. In front of the præcuneus, again, is a rather ill-defined region, called the *paracentral lobule*, because it corresponds in situation with the fissure of Rolando, and the two central convolutions on the outside of the brain.

This is the general structure of the hemisphere on its median surface. But its most important feature is a convolution which lies immediately above the corpus callosum. It is called the *gyrus fornicatus*, because it has an arched or vaulted form; and it encircles the corpus callosum, the cerebral ganglia, and the crus cerebri in a continuous longitudinal curve.

It starts from the inferior part of the anterior lobe, just in front of the Sylvian fissure. It turns up round the anterior extremity of the corpus callosum, and runs along its upper border. Here it is included between the corpus callosum below and the fissura calloso-marginalis above. It extends backward, in this part of its course, as a single independent convolution, as far as the ascending branch of the fissura calloso-marginalis. There it makes one or two connections with the præcuneus, and farther back with the cuneus also. It then curves round the posterior extremity of the corpus callosum, passes beneath the crus cerebri, and runs downward and forward to a point just behind the fissure of Sylvius, almost exactly opposite the place from which it started. In this lower portion of its course it is often designated as the "gyrus hippocampi;" and it in fact

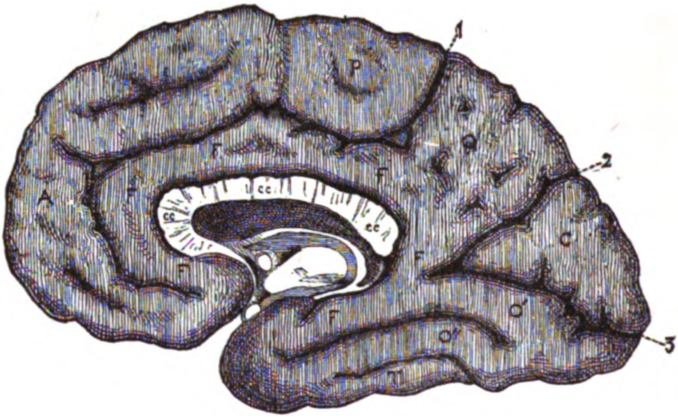

FIG. 4.—HUMAN BRAIN ; MEDIAN SURFACE OF THE RIGHT HEMISPHERE.

A. First frontal convolution.
F. Gyrus fornicatus.
P. Paracentral lobule.
Q. Lobulus quadratus, or Præcuneus.
C. Cuneus. O′, O″, Occipito-temporal convolutions.
T. Third temporal convolution.
c. c. Corpus callosum. 1. Fissura calloso-marginalis ; 2. Fissura parieto-occipitalis ; 3. Fissura calcarina.

forms the hippocampus major by the inflection of its gray matter in the inferior horn of the lateral ventricle.

This convolution may almost be regarded as the fundamental convolution of the whole hemisphere, for it lies like a cap over the end of the crus cerebri, the internal capsule, and the cerebral ganglia.

The structure of the cerebrum may therefore be stated briefly in this way: The crus cerebri comes up from below and reaches the cerebral ganglia. The internal capsule and the corona radiata connect the cerebral ganglia with the convolutions of the cortex. That part of the cortex nearest the cerebral ganglia is the insula, and all the rest of the cerebral convolutions are arranged, in a more or less continuous curve, around this spot.

All these points are tolerably well known, and receive the general assent of anatomists who have paid particular attention to the brain.

Now, as to the special anatomy of the corpus striatum. By the term corpus striatum, as already mentioned, we now understand only the intra-ventricular nucleus of the ganglion, or that which lies above and on the inside of the internal capsule. It is usually described as consisting of a thick or club-shaped portion directed forward, and a slender tail-like extremity directed backward, which runs along the outer edge of the lateral ventricle, and terminates somewhere about the posterior border of the optic thalamus. In reality it is much more extensive than this. A few writers speak of it as reaching into or to the inferior horn of the ventricle; but the only ones, so far as I know, who have described it in a really satisfactory way are Gratiolet, Todd, and Ludovic Hirschfeld. The best account of all is that given by Gratiolet, in his *Anatomie Comparée du Système Nerveux*, published in 1857. This description is generally ignored by present writers, and it is expressly stated by so high an authority as Henle, in his last edition, 1879, that the tail-like process of the corpus striatum "tapers gradually from before backward, and terminates in a point opposite the end of the optic thalamus." (*Handbuch der Nervenlehre*, Braunschweig, 1879, p. 155.)

On the contrary, the real form of the corpus striatum is almost that of a complete ring. This can often be seen quite distinctly, without further preparation, when the lateral ventricle has been opened completely from the inside. The slender continuation of the corpus striatum may then be traced, throughout its course, by the pinkish-gray color of its substance, showing through the transparent lining of the ventricle. The body of the corpus striatum grows smaller as it extends backward in the upper part of the ventricle, and soon runs into the well-known tail-like prolongation. This prolongation reaches the posterior end of the optic thalamus, curves downward into the inferior horn of the ventricle, and then runs forward again to the anterior ex-

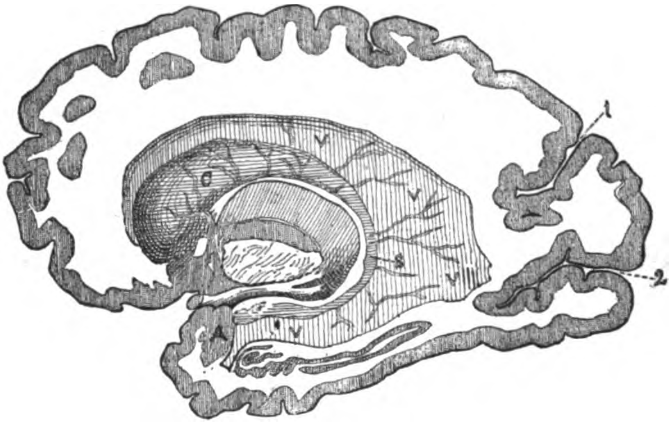

FIG. 5.—LONGITUDINAL AND VERTICAL SECTION OF THE RIGHT HEMISPHERE, SHOWING CAVITY OF LATERAL VENTRICLE; SEEN FROM THE INNER SIDE.

C. Corpus striatum. S. Surcingle. V. Ventricle. A. Amygdala. 1. Fissura parieto-occipitalis; 2. Fissura calcarina.

tremity of the inferior horn. It thus encircles the crus cerebri and internal capsule with a narrow band of gray matter, like a loop or surcingle; it ends below in the inferior horn of the ventricle, almost exactly opposite the point where it started in the anterior horn, and it repeats, within the cavity of the ventricle, the same folded or curvilinear arrangement that is to be seen in the gyrus fornicatus and in the convolutions of the cortex generally.

The head of the corpus striatum is not only connected with the lenticular nucleus, but also with the gray matter at the base of the brain, just in front of the Sylvian fissure. The extremity of the surcingle, on the other hand, is connected with a deposit of gray matter forming the anterior wall of the inferior horn of the ventricle. This gray mass is known as the "amygdala." It is sometimes spoken of as an independent nucleus, but it is really continuous with the convolutions of the base of the brain, immediately behind the fissure of Sylvius.

In a view of the ventricle opened from the inner side it is seen that the curved prolongation, or "surcingle," of the corpus striatum is not of the same size throughout. It diminishes considerably in thickness while approaching the end of the optic thalamus, then increases somewhat during its downward curvature, again becomes more slender, and finally terminates at the front part of the inferior horn, in a visibly enlarged extremity. Very often, but not always, it is more or less interrupted near this enlarged portion by one or two bundles of white fibres, which cross it obliquely from above downward. These fibres come from the lower portion of the tænia semicircularis. The tænia semicircularis is well known, in the upper part of the ventricular cavity, as a slender ribbon of white substance, running from before backward along the floor of the ventricle, between the optic thalamus on the inside, and the corpus striatum on the outside. It accompanies everywhere the concave border of the surcingle, following the same curvature downward into the inferior horn of the ventricle, then runs forward along the roof of the inferior horn to its anterior end, and there terminates in the amygdala. It is a little before this termination that some of its fibres are seen to cross the gray matter of the surcingle.

The reason why this annular form of the corpus striatum is not more easily recognized in brain sections is that its two parts are so distant from each other and so variable in size. If a vertical and transverse section of the brain be made somewhat in front of the anterior commissure, it will show the head of the corpus striatum, in that situation, of very large size. In a similar section, passing behind the anterior commissure and through the front part of the optic thalamus, the corpus striatum will appear smaller; and in one passing through the middle of the optic thalamus it will be smaller still. It there begins to present the cut surface, not of the head of the corpus striatum, but of its tail-like appendage. If we continue to make sections farther and farther back, the appendage will at last disappear, and this disappearance will happen about the time the sections pass the posterior end of the optic thalamus. It is this fact, no doubt, which has led to the belief that the corpus striatum comes to an end about the same region. But in reality it has not done so. It has curved downward in the space left between two successive sections, and has entered the inferior horn of the ventricle, to run forward toward its termination in the amygdala. Sometimes a section will happen to strike exactly the plane of curvature of this part, and will then show a more or less elongated tract of gray matter, running from above downward, a little to the outside of the optic thalamus. In a transverse section of the brain, through the middle of the optic thalamus, the caudate portion of the corpus striatum is visible above the internal capsule and lenticular nucleus (Fig. 1, 4). But there is also a smaller isolated area of gray matter below the level of the lenticular nucleus, and near the outer part of the inferior horn of the ventricle (Fig. 1, 5). Now these two sections, one above the internal capsule, and one below it, are the same thing, or rather they are two different parts of the same thing. One of them is that part of the corpus striatum which occupies the floor of the lateral ventricle above, the other is that which runs along the roof of the inferior horn below. In every section behind this, both these two parts will be visible, until a point is reached a little beyond the optic thalamus, when they will both disappear together.

The same figure shows how other parts of the brain, which are arranged in a looped form, may appear twice in a vertical section. In the brain of the fox (Fig. 2) it is evident that a section made at right angles to the fissure of Sylvius would cut the frontal convolutions in front of this fissure, and also the temporal convolutions, in reverse order, behind it. In Fig. 1 the same thing appears in the human brain. The frontal convolutions above the Sylvian fissure correspond in number with the temporal convolutions below it. In the parietal region their direct continuity is interrupted by the downward curvature about the fissure of Rolando; but still it is perfectly evident that the first temporal convolution (T′) is really the end of the third frontal (F‴), the second temporal (T″) of the second frontal (F″), and the third temporal (T‴) of the first frontal (F′). The remaining convolution of the temporal lobe, the gyrus hippocampi (H), is the termination of the gyrus fornicatus (Fo). In Fig. 4 the curvature of this convolution is shown throughout its length. It is plain that, in a vertical section passing through the middle portion of the brain, it would be cut twice; once above and once below the situation of the cerebral ganglia.

It is not very easy to make a longitudinal section of the brain which shall pass continuously through the whole of the ring, or loop, formed by the corpus striatum and the surcingle. All the parts of the loop are not exactly in the same plane, either vertically or longitudinally. Its posterior portions are situated farther from the median line than the anterior, and its superior and inferior branches are so slender and so widely separated that it is difficult to make a single oblique cut which shall show the whole of both. It can be done, however, by following carefully with the edge of a knife the curved track of gray substance from point to point, until the whole of it is exposed, and then removing the adjacent white substance down to

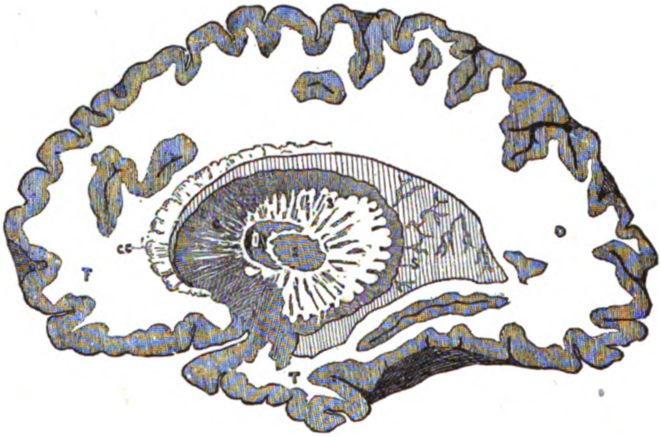

FIG. 6.—LONGITUDINAL AND VERTICAL SECTION OF THE RIGHT HEMISPHERE, THROUGH CORPUS STRIATUM AND SURCINGLE; SEEN FROM THE INNER SIDE.

F. Frontal lobe. **O.** Occipital lobe.
T. Temporal lobe. **C.** Corpus striatum.
S. Surcingle. **cc.** Part of corpus callosum.
1, 2. Middle and internal zones of lenticular nucleus.
3. Diverging fibres of internal capsule.

the same level. Such a section is shown in the accompanying figure.

It has exposed the white surface and radiating structure of the internal capsule, and near its centre a little of the internal and middle zones of the lenticular nucleus. Surrounding the capsule is the gray tract of the corpus striatum and surcingle. In the head of the corpus striatum the bundles of white fibres are visible, traversing the gray matter in the form of distinct streaks, or striations, to within a short distance of its outer border. In the slender curved portion, on the other hand, no striations are to be seen, the color being everywhere of a uniform gray. But throughout this region the radiating fibres of the internal capsule pass beneath the band of gray substance obliquely, from within outward, in the form of distinct bundles; and between these bundles the gray matter of the surcingle dips down, more or less deeply, at irregular intervals.

It is for this reason that transverse sections of this part of the corpus striatum vary so much in apparent size. If the cut happen to pass through a projecting bundle of the internal capsule, the section of the surcingle will appear small. If it pass in the interval between two bundles, the area of gray matter exposed will be considerably larger. From the same cause the sections are often unequal on the two sides of the brain. The projecting bundles of the internal capsule and the gaps between them seldom correspond exactly in the right and left hemispheres; and if they did, we could hardly make a section, either horizontal or transverse, which should follow with entire precision the same plane on the two sides. But, notwithstanding these apparent inequalities and variations, the gray matter is continuous throughout the curved portion of the corpus striatum.

These facts are altogether anatomical. It cannot be claimed that they throw any light whatever on the physiological characters of the corpus striatum. But they show that *this important ganglion, situated in the interior and at the base of the brain, has the same annular form which is repeated externally in the general configuration of the hemispheres.*

" *Caput ad cerebri inspectionē qui parandum.*"

VESALII, DE HUMANI CORPORIS FABRICA, 1543, p. 650.

Original Papers.

DOUBLE MONSTERS.

Description of the Specimens in the Museum of the Brooklyn Anatomical and Surgical Society, with Remarks.

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THE classification adopted in the present paper is that of Fisher, see Articles on Diploteratology, Transactions of the New York State Medical Society, 1865–66–67 and 68.

This classification is itself based upon the one elaborated by Förster (*Die Missbildungen des Menschen*), whose divisions have been improved and made to follow a more natural order by Fisher.

Double monsters include only beings in which traces of duplicity in the cerebro-spinal axis exist. The method of their development is thus stated by Fisher: "They are invariably the product of a single ovum, with a single vitellus and vitelline membrane, upon which a double cicatricula or two primitive traces are developed. The several forms of double malformation, the degree of duplicity, the character and extent of the fusion, all result from the proximity and relative positions of the neural axes of two more or less complete primitive traces developed on the vitelline membrane of a single ovum."

The clue is thus given to a method of natural classification; the two primitive traces may fuse at their caudal extremity and diverge in varying degrees as they ascend;

the result is a double being separated above and joined below, the cleft of the cerebro-spinal axes being from above downward; hence Order I. *Terata katadidyma*, monsters with downward cleavage.

If the fusion is at the cephalic extremity with divergence of the caudal extremities, a double being is produced single above and double below; Order II. *Terata anadidyma*, monsters with upward cleavage.

If the two primitive traces approach at points in their continuity only, while the two extremities diverge, a double being results, double both above and below, with union between; Order III. *Terata anakatadidyma*, monsters with both upward and downward cleavage.

The differing degrees of duplicity found under each of these orders constitute minor divisions—genera and species —for the nomenclature of which concisely descriptive terms are adopted; the result of this is that in this classification the name by which any specimen is characterized embodies a fair description of them. I think it merits adoption in preference to any other heretofore suggested.

SPECIMEN I. *Order*, Terata katadidyma; *Genus*, dicephalus; *Species*, dibrachius, dipus; *Variety*, diauchenos.

History: Mother multiparous; utero-gestation was unattended with anything noteworthy; earlier stages of labor were prolonged; a head was finally delivered by forceps, after which no progress was made for some hours. Dr. Andrew Otterson, having then been called, attempted to introduce his hand into the uterus for exploration: partial version of the retained parts resulted from this attempt, so that the breech engaged; efficient contractions followed, producing expulsion of the breech and body, followed lastly by the second head. The child was dead when delivered. The mother recovered without drawback. Specimen presented by Dr. Andrew Otterson.

Description.—External Configuration. A fully-developed male child. It has two distinct and perfect heads and necks; one trunk; two upper and two lower extremities.

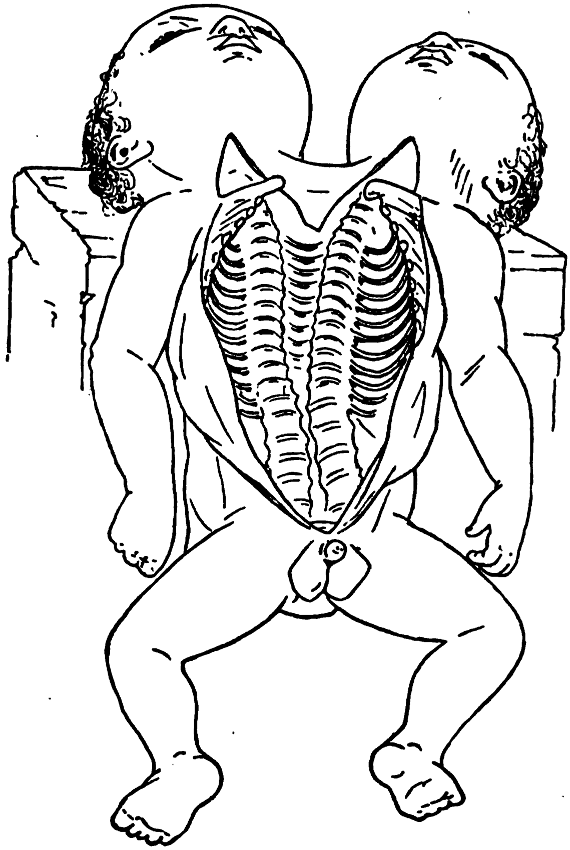


FIG. I.—DICEPHALUS DIBRACHIUS. DR. A. OTTERSON'S CASE.

Its extreme length is 48 centimetres (19 inches).

The girth of the chest, over nipples, is 39 centimetres (15¼ inches).

The two heads differ slightly in their size; the circumference of the left head is 36 centimetres (14¼ inches), that of the right head is 33 centimetres (13⅛ inches).

There is no anal orifice.

The genitals are male, single and perfect.

Skeleton. The vertebral columns are distinct and perfect throughout; they approach each other gradually from above downward as far as to the lumbar region, whence they run parallel to each other, being separated by a small interval; the sacra, each distinct and perfect, articulate with each other by means of an interarticular fibro-cartilage which unites the contiguous auricular surfaces of the two bones.

From each sacrum springs the innominate bone which forms the wall of the pelvis upon that side; at the symphysis pubis the two unite as usual.

The corresponding dorsal vertebræ of the two columns are united by a series of bony arches formed by coalesced ribs; each arch or compound rib has two normal heads, one at either extremity, by which it articulates with its proper vertebræ. The length of these arches decreases from above downwards, the longest being 38 millimetres (1½ inches) long.

The ribs, which spring from the free sides of the two vertebral columns, are connected to a common single sternum in front by unusually long costal cartilages, and thus complete the thorax.

The clavicle and scapula of either side are normally related to the sternum and ribs.

Resting upon the posterior face of the upper compound ribs, in the middle of the back between the two series of dorsal spines, is a compound scapula formed by the fusion of two bones along their anterior edges; an acromion process, club-shaped, projects forward from the middle of the upper edge of this compound scapula; articulating with this process, and passing directly forward to articulate with the sternum at its upper border, the episternal notch affording an articulating surface, is a slender compound clavicle.

Respiratory System. Two sets of respiratory organs are present, each independent and perfect. There are four pleural sacs. By the blending of the pleural layers which lie in contact in the middle line, a fibro-serous septum is formed which divides the thorax into two cavities posteriorly; these middle pleural sacs and their contents are hidden from view anteriorly by a large pericardial sac, with the posterior wall of which the anterior margin of the septum described becomes blended.

Circulatory System. The pericardium lies in the middle line, directly behind the sternum, and extends to some distance on each side of it. The sac is single, and incloses a compound heart (Fig. 2), the ventricular portions of which remain separate, while the auricles are blended together. Constituting the left mass of this heart are two ventricles and one auricle, the left, which are of normal size, shape, and relative position. The origins and relations of the aorta and pulmonary artery upon this side are normal. Into the auricle enter four pulmonary veins. The elements of the right mass are more changed: there is but one ventricle, which however is larger than either of the ventricles of the other mass; from the right side of its base springs a second aorta; there is no pulmonary artery on this side. There is no apparent attempt at differentiation of the auricles; there is simply a single capacious auricle (d), which is blended with the right auricle from the left mass, forming a huge venous reservoir. At the right posterior side of this reservoir enter two small pulmonary veins from the right pair of lungs.

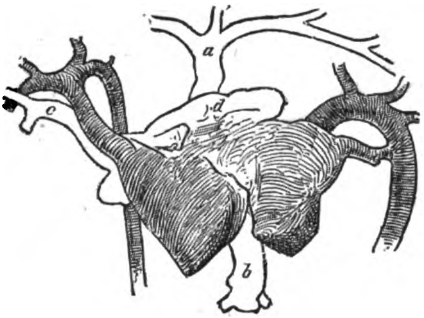


FIG. 2.—COMPOUND HEART.

a. Descending Vena Cava; b. Ascending Vena Cava; c. Right Innominate Vein; d. Compound Auricle.

A single ascending vena cava (b) gathers the blood from the lower portion of the body; above, the left innominate vein of the left child crosses transversely its neck to the point of junction of the two necks, receiving the right internal jugular in its course; here it is joined by the left internal jugular of the right neck, and by a large anomalous vein from behind; the large descending vena cava (a) thus formed descends in a straight course to the middle of the compound auricle. The right innominate vein (c), formed by the right internal jugular and right subclavian veins of the right neck, empties into the compound auricle at its right side.

The two aortas descend each upon the left side of their proper vertebral columns; they do not unite below, nor bifurcate, but each diverging continues as a common iliac, and after giving off the umbilical artery, passes on to be distributed to a lower limb.

Digestive System. There are two stomachs. The left is of normal shape and size, and occupies its usual place in the abdomen. To its cardiac end is attached a normal spleen, the only one present. The right stomach is smaller, pyriform in shape, hidden behind the liver, lies very obliquely, with its pylorus pointing toward the pylorus of the other. Its duodenum joins at once the left duodenum, and the two bowels appear fused together for one sixth of their entire length; a well-marked longitudinal groove so marks the fused bowel that the appearance of a double-barreled gun is produced; transverse section shows that they are divided by a membranous septum into two distinct

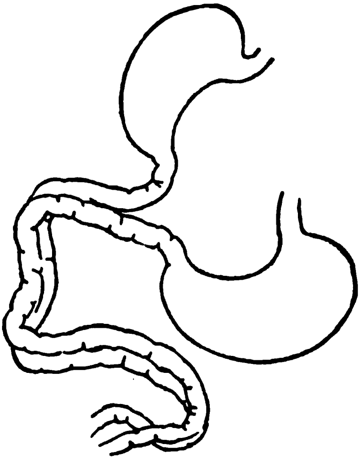


FIG. 3.—STOMACHS AND COMPOUND DUODENUM.

canals, which communicate freely with each other by frequent openings in the septum; the bowel then divides into two distinct tubes, each with its own mesentery; this persists through a length equal to one third of the whole; then they again fuse, and the double-barrel arrangement persists through a length somewhat greater than at the beginning; the small intestine finally becomes single, and continues thus to its junction with the large intestine, which likewise remains single to its termination; at the point of beginning of the single tube a small nipple-like diverticulum exists.

The rectum descends to the bottom of the pelvis, where it ends in a cul-de-sac.

The entire length of the small intestine is 1.84 metres (72½ inches); that of the large intestine 66 centimetres (26 inches).

The liver, upon its surface, appears to be a simple organ, but from its posterior inferior border project supernumerary lobes, the evident remains of a second liver. There is but one gall-bladder.

Genito-urinary System. There are three kidneys — a large compound kidney lying in the mid-lumbar sulcus, and one in either lateral lumbar region.

The left kidney is greatly atrophied; the bladder is single; the genital organs single and well developed.

Nervous System. Each head and neck, and each lateral half of the body is supplied by its own cerebro-spinal axis; along the line of fusion only is there any communication between the branches of the two axes.

Remarks. The genus dicephalus, to which this specimen belongs, is characterized by the existence of two distinct and separate heads, either equal or unequal, with various degrees of duplicity in the vertebral column. The component bodies are laterally conjoined; both of the faces look anteriorly, and usually in the same direction. Fisher states that of five hundred cases of human double monsters which are recorded, almost one-third belong to this genus; in these the female sex preponderates in the proportion of about two to one.

Viability. Apart from the accidents of birth, was this monster viable? The answer to this is found in an examination of the structure of the heart and great vessels. Of the compound heart, the left mass displays all the parts of a complete heart, and the arrangement of the great vessels is normal, so that the aeration of the blood and its supply to the left child is fully provided for; the right mass is composed of but one auricle and one ventricle; the venous blood passing from the one to the other would have been at once driven on into the right aorta; no pulmonary artery exists to receive even a portion of it for transmission to the right pair of lungs, which, for purposes of aeration, would accordingly have been useless. No inosculation between any large arteries of the two systems exists to have permitted any admixture of arterial blood with the venous current of the right system. This condition would have entailed immediate asphyxia upon the right child, had the monster been delivered alive; the speedy death of the left child would have followed; this specimen was not viable.

Closely related to this specimen, but illustrating a degree of fusion less extensive is the living female double monster known as the St. Benoit twins. In this being the division extends through the thorax as far as to the abdomen; so that the thoracic organs and the upper extremities, as well as the necks and heads, are separate and distinct. During the months of December, 1878, and January and February, 1879, this being was exhibited by its parents in this city. Upon the 28th of February it completed its first year. During this time I visited it repeatedly, but met with much difficulty in any attempt at thorough examination of it from the unreasonable fears and prejudices of the parents. I was finally successful however in obtaining an inspection of its whole body, and in enabling Mr. Dickinson to make the sketch which accompanies this report, and which represents well its external configuration.

The names *Marie* and *Rose* have been given to the right

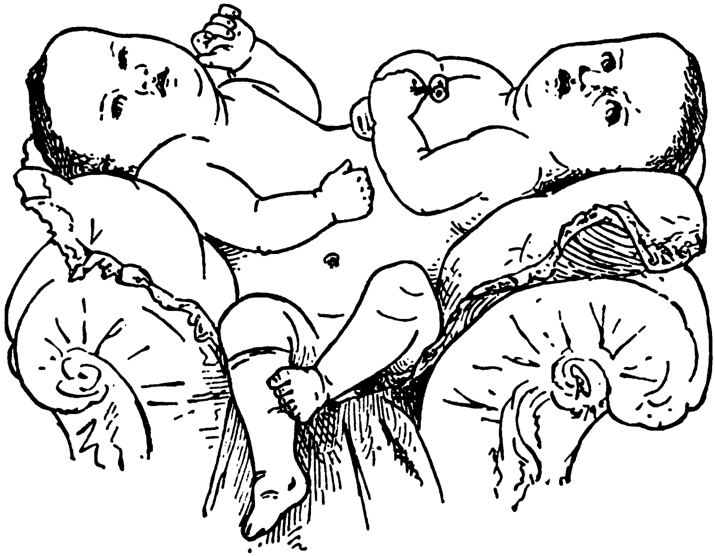


FIG. 4.—ROSE-MARIE DROUIN, "THE SAINT BENOIT TWINS."

and left child respectively. Their patronymic is *Drouin*. In the Canada *Medical and Surgical Journal* of October, 1878, I have since found a description of these beings by Prof. D. C. MacCallum, of Montreal, which, as it corresponds with my own later observation, I repeat:

Marie is more strongly developed and healthier looking than her sister *Rosa*, who is smaller, darker and more delicate looking. They are both bright, lively and intelligent looking children. The two bodies, from the heads as far as the abdomen, are well formed, perfectly developed, and in a state of good nutrition. The union between them commences at the lower part of the thorax of each, and from that part downwards they present the appearance of one female child ; that is, there is but one abdomen with one navel, a genital fissure with the external organs of generation of the female, and two inferior extremities. The floating ribs are distinct in each, as is also the ensiform cartilage. The lateral halves of the abdomen and the inferior extremities correspond in size and development respectively to the body of the same side ; and the same remark applies to the labia majora. The spinal columns are distinct and appear to meet at a pelvis common to both, although the fusion of the children commences at some distance above their junction. From near the extremity of each spine a fissure extends downwards and inwards, meeting its fellow of the opposite side at the cleft between the buttocks near the anus, including a somewhat elevated soft fleshy mass, thicker below than above. At a central point between these fissures, at the distance of *two and a half inches* [64 mm.] from the point where the vertebral columns meet, and *three and a half inches* [89 mm.] from the anus, there projects a rudimentary limb with a very movable attachment. This limb, which measures *five inches* [127 mm.] in length, and is provided with a joint, tapers to a fine point, which is furnished with a distinct nail. It is very sensitive, and contracts strongly when slightly irritated.

The spinal, respiratory, circulatory and digestive systems of these children are quite distinct. They have each a separate diaphragm, and the abdominal muscles on each side of the mesial line, and the limbs of that side are supplied with blood by the vessels, and are under the control of the nervous system of the corresponding child. They have each a distinct stomach and an alimentary canal, which probably opens at a point close to the common anus. It would follow also that the accessory organs of the digestive system are distinct for each child.

The two fissures behind are evidently the original clefts between the buttocks of each child, one buttock remaining in its integrity, whilst the other in a rudimentary condition is fused with that of the opposite child, forming the soft fleshy mass from the upper part of which the rudimentary limb projects.

These children are the products of a second gestation. They were born at St. Benoit, county of Two Mountains, on the 28th February, 1878. The mother is a fine, healthy-looking woman, aged 26 years. Her labor lasted seven hours, commencing at 1 A.M. and terminating at 8 A.M. One head and body were first born; this was shortly followed by the lower extremities, and immediately after the second body and head were expelled.

This being belongs to the genus dicephalus; species, tetrabrachius tripus.

The St. Benoit twins have now survived their birth a longer period than in any other recorded instance among the three-footed, four-armed dicephalic monsters. The case recorded by MacLaurin, in the Philosophical Transactions, London, 1723, Vol. XXXII. p. 346, which lived for two months, is the next longest lived recorded.

When last examined by myself, this being had attained thirteen months of age; its vital functions were all being performed regularly and properly, and the mental development of the two parts was equal to that usual to children of its age. It apparently had as good an expectation of living to maturity as any other infant.

This being, though strictly included in the species to which I have assigned it, still, in consequence of the very rudimentary character of the third pelvic limb, approaches very closely to the species dicephalus tetrabrachius dipus, which it resembles in its

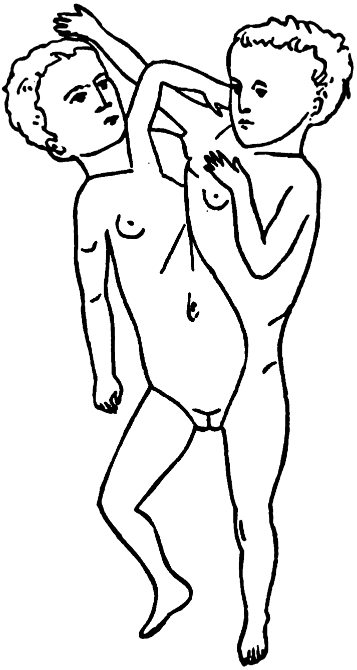


FIG. 5.—RITTA-CHRISTINA.

high degree of viability. This rudimentary limb had not grown correspondingly with the rest of the body, and when seen by myself was but little longer than it is described to have been by Dr. MacCallum, ten months before. To this latter species belongs the widely-known case, Ritta-Christina, which died at Paris, November 23d, 1829, having lived eight months and eleven days.

SPECIMEN II. *Order*, Terata Katadidyma; *Genus*, dicephalus; *Species*, dibrachius; *Variety*, monauchenos.

History: This specimen of two-headed, single-necked monster, with one body and two anterior extremities, is a lamb which was born in the spring of 1874 near Plainfield, N. J. Having been at once discarded by its mother, it was spoon-fed for a time; it received nourishment by one mouth only, some imperfection seeming to exist in the other. It lived between two and three weeks. It was then prepared by a taxidermist, and no record made of its internal structure. It was afterwards secured by Dr. A. R. Matheson, by whom it has been presented to the museum of the society.

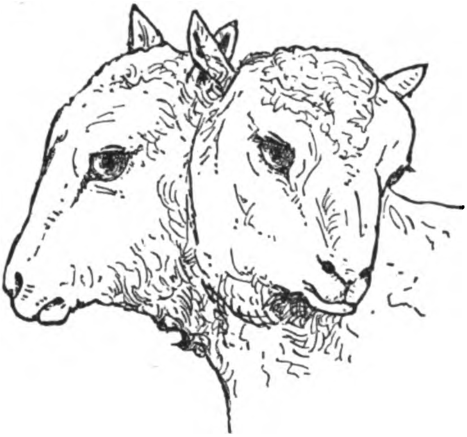


FIG. 6.—TWO-HEADED LAMB.

Description. The heads are equal and perfect, as far as external examination shows; they form an obtuse angle with each other as they spring from the single neck; the neck externally shows no evidence of duplicity, although undoubtedly there did exist some duplicity in the upper cervical vertebræ. It is to be regretted that the arrangements of the tracheæ and œsophagi cannot be ascertained.

According to Fisher, this is an extremely rare variety of duplex formation, so much so that only two or three examples of it have ever been recorded.

SPECIMEN III. *Order*, Terata Katadidyma; *Genus*, diprosopus; *Variety*, triophthalmus.

This specimen of double-faced, three-eyed monster, is a small chick, the history of which is unknown. It was presented to the museum by Mr. James E. Pilcher. The accompanying figures admirably exhibit the degree of duplicity present. The angle made by the converging facial planes is very acute, so that the two bills are nearly parallel, and but little separated from each other. The median eye, its palpebræ being single, presents two globes within its orbit, which are fused together.

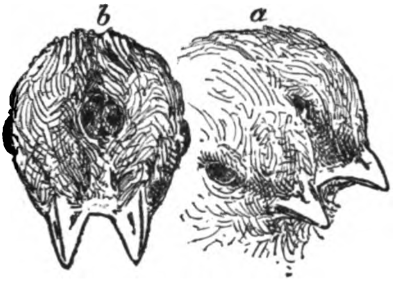


FIG. 7.—DOUBLE-FACED CHICK.
a. side view. *b.* front of the same.

These three museum specimens, together with the Saint Benoit twins, illustrate well a gradually descending scale of duplicity resulting from a less and less degree of divergence of the cephalic extremities of two primitive traces. They are all well-marked examples of monsters duplex with downward cleavage. The order of monsters duplex with upward cleavage is equally well represented in the two remaining specimens in which the vertebral axes, independent and divergent at their caudal ends, gradually approach until finally they become fused at their cephalic ends.

SPECIMENS IV. and V. *Order*, Terata Anadidyma; *Genus*, syncephalus; *Species*, monoprosopus.

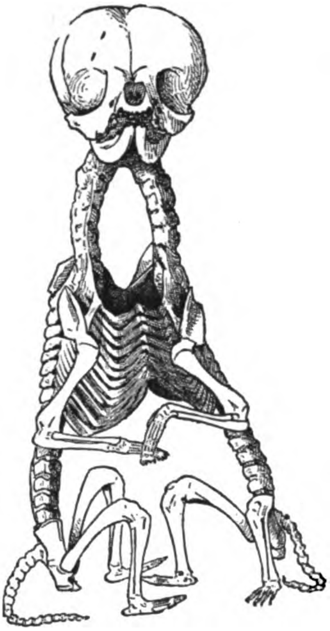


FIG. 8.—SKELETON OF SYNCEPHALIC DOG.

These two specimens of double-bodied, single-headed, single-faced monsters are identical with each other in their general characters. Specimen IV. (Fig. 8) consists of the skeleton of a duplex puppy which did not survive its birth. It was presented by Dr. J. H. Raymond, and prepared by the writer. The sex was female. There was a common umbilical cord, containing a single umbilical vein; the liver was compound; the stomach and upper two thirds of the small intestine were single, the intestinal canal then bifurcated and was double to its end; the genito-urinary systems were independent and complete for each body; the thorax contained two perfect sets of lungs; the hearts were fused.

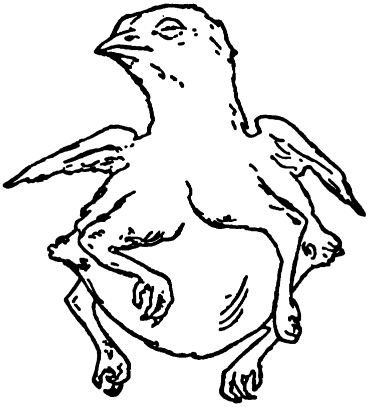


FIG. 9.—SYNCEPHALIC CHICK.

Specimen V. (Fig. 9) is a duplex chick which was presented by Dr. George W. Baker. Its viscera have not been examined. In these specimens, the head presents no external trace of duplicity; the spinal axes of the compound body, closely juxtaposed at their cephalic extremities, rapidly diverge, and from each of them is developed a complete bony skeleton; these blend so as to form a compound thorax as follows: each lateral half of the sternum with its proper ribs is reflected outward to the right and to the left, and becomes conjoined to the corresponding half sternum of the opposite skeleton. The thoracic cavity thus resulting has a sternum anteriorly and posteriorly, a vertebral column at either side, and walls composed of forty-eight ribs. Four complete anterior extremities spring from this thorax. Each pelvis is separate and distinct, and has its perfectly developed limbs. In the case of the pup the fusion extended as far as to the umbilicus. In the case of the chick the fused abdomens form a demi-ovoid body suspended between the four feet of the animal. It did not survive its birth. According to Is. G. Saint Hilaire (1832) this class of monstrosities is comparatively common among animals, but very rare in man, to but two cases of which is he able to refer. Fisher's treatise is still incomplete; the published part of it does not include the syncephali, but in his manuscript, which I have been permitted to examine, I find mention of eight recorded instances of human syncephali.

Historical and Bibliographical Notes:

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

BY GEORGE JACKSON FISHER, M.D.

I. ANDREAS VESALIUS.

1514–1564.

OVER three and a third centuries ago a young man, twenty-two years of age, already professor of anatomy in the renowned University of Padua, lectured and demonstrated anatomy before large classes, and labored industriously with scalpel and quill in the preparation of a work upon this subject which should surprise the world and immortalize his name. He had attentively listened to the prelections of Jacobus Sylvius, and of Johannes Guentherius, at Paris; he had read most critically all that Galen had written on the structure and use of the several parts of the human body, which, by the way, was the chief authority from which his masters had derived the materials for their discourses. He had perused the only text-books then existing, the little tractates or opuscula of Mundinus, Berrenger, Dryander, and Massa, yet none of them were satisfactory to this ambitious youth. So he toiled on and spared no expense. He induced Titian's favorite pupil and most perfect imitator, Johann Stephan von Calcar, to leave his studio and sit by his side in his dissecting room, and carefully delineate the parts as he demonstrated them; the engravers were set at work; the famous press of Joannem Oporinum of Basle slowly but perfectly worked off the sumptuous folio sheets of the Opus Magnum, entitled "*De humani corporis fabrica, Libri septem.*" Thus in the year of grace 1543, Andreas Vesalius, the young professor (æt. 28), published far the most splendid work on anatomy the world had ever seen. Space will not permit a description of its engraved title-page, representing the lecturer, the cadaver, the class of students, etc., and scarcely an allusion to the curious initial letters with their quaint and cunning little anatomical conceits, some of which are reproduced in this number. The initial which introduces this sketch is the one with which Vesalius begins his first chapter, the words running thus: *Os cæterarum hominis partium est durissimum, & aridissimum, maximeque terrestre & frigidum, & sensus denique praeter solos dentes expers.* No analysis of the contents of the almost seven hundred large folio pages of this book can be here attempted. It must suffice to say that it was and is a glorious book, a rare and precious monument of genius, industry, and liberality.

The subject of this sketch was born at Brussels, Dec. 31, 1514. "Three weasels formed the family arms of Andreas, whose name was properly Wesalius" (Morley). He was one of a long line of medical men; Peter Wesalius was famous; Everard, his grandson, wrote commentaries on the books of Rhases, and upon the Aphorisms of Hippocrates, and thus it seemed that "the veins of the family, in fact, ran medicine." He was highly educated for the period in which he lived; his great work affords proof of the singular purity of his Latin style, and his Greek annotations to the works of Galen exhibit his familiarity with that tongue. He read Avicenna in the original Arabic, and wrote a paraphrase of the ten books of Rhases to the Emir Almansor. In 1535, at the age of twenty, he served as a surgeon in the army of the Emperor Charles V., during the French war. In 1537 he was chosen professor of anatomy at Padua, being the first purely anatomical chair ever instituted. This he held seven years, being at the same time professor at Bologna and Pisa.

After the abdication of Charles V., he became the physician of Philip II. In 1555 he published an augmented edition of his great work, from the same old printing house in Basle; the first contained 659 pages and 23 leaves; this, 824 pages and 28 leaves. The title-page, initials, and at least some of the figures are re-engraved; the type is different, and the pages larger. In a fit of passion, he burned all his manuscripts, and little has been printed except his anatomical works, and his little work on a species of sarsaparilla. The great work on surgery, commonly included among his writings, is said to have been written "by a Venetian, Prosper Bogarucci, a literary crow, who fed himself upon the dead man's reputation" (Morley).

In 1564 he was obliged to make a pilgrimage to Jerusalem, to atone for an alleged sacrilege in opening the body of a young Spanish nobleman, who was not yet dead. The rumor is believed to have been false; however he went, and on his return was shipwrecked on the island of Zante, where he perished miserably of hunger and grief, on the 15th of October, 1564, before he had quite reached the age of fifty. His remains were placed in the Church of St. Mary, on that island.

His great work on anatomy has been printed as follows: Basle, fol., 1543, 1555, 1563; Zurich, fol., 1551, 1573; Lyons, 2 vols., 8vo, without figures, 1552; Paris, fol., 1559, 1564; Venice, fol., 1568, 1604; Antwerp, fol., 1572; Frankfort, 4to, 1604, 1632; Amsterdam, fol., 1617, 1640; Leyden, fol., 2 vols., 1725.

The plates have been published in various styles and sizes, and frequently used to illustrate different works on anatomy, both with and without acknowledgment. They were engraved originally on wood (xylographic). In 1545 Thomas Gemini, an engraver, cut them in copper, being the first rolling press work ever done in England, and published them in London under his own name, and also in 1553, and in 1559; the first with Latin text, the last two with English letterpress.

"Ligamenti in tendinibus continendis usus."

VESALII DE HUMANI CORPORIS FABRICA. 1543. P. 215.

EDITORIAL DEPARTMENT.

THE BROOKLYN ANATOMICAL AND SURGICAL SOCIETY.

DIGEST OF THE REPORT OF ITS SECRETARY FOR THE PERIOD EXTENDING FROM MARCH 20TH, 1878, TO DECEMBER 31ST, 1879.

Organized, March 20th, 1878; incorporated, September 6th, 1879.

Number of meetings held, 24.

Number of papers prepared and read, 65.

Number of pathological specimens presented in conjunction with papers, 75, exclusive of a large number of specimens deposited in the Museum unaccompanied by histories or remarks.

Number of special lectures and demonstrations before the Society, 27, by Professors Frank H. Hamilton, Fessenden N. Otis, Henry G. Piffard, Henry D. Noyes, L. S. Pilcher, Dr. J. S. Prout, Prof. J. C. Dalton, Dr. J. C. Shaw, Prof. J. L. Little, Drs. Norman Kingsley, Arthur Mathewson, George J. Fisher and Albert H. Buck, Prof. E. S. Bunker, Dr. John A. Wyeth, Profs. Joseph W. Howe and Daniel Ayres.

Its Medical School was incorporated Oct. 17th, 1879, under the direction of a board of trustees, consisting of Rev. James M. Buckley, D.D., Hon. John French, Joseph C. Hoagland, Esq., Hon. Darwin R. James, Hon. Geo. G. Reynolds, LL.D., Francis S. Street, Esq., James H. Taft, Esq., and Hon. Stewart L. Woodford, in addition to the members of the Council of the Society, for the purpose of securing to the Society a legal right to procure and use anatomical material, and to pursue its work of promoting the study of anatomy, surgery, and pathology without interruption. In this school, demonstratorships of anatomy, histology, operative surgery, and surgical pathology have been established.

The departments maintained by the Society during the year at No.

28 Madison Street are a Museum of Human and Comparative Anatomy, both healthy and morbid, gross and microscopic; a Library, as yet but a nucleus, in which is intended to be gathered works of reference, illustrated works, works of historical interest, and in general such works as are not likely to be found in private libraries relating to the domain of anatomy, surgery, and pathology; an Anatomical Laboratory, thoroughly equipped and intended to afford members of the profession opportunity for anatomical, surgical, and pathological investigations; and a Histological Laboratory, in which every facility for study in normal and pathological histology is afforded.

The first volume of the "Annals" of the Society is now ready for distribution. It is a handsome volume, large octavo, 126 pages of closely printed matter, bound in muslin, with gilt top. In addition to the descriptions and illustrations of anatomical and pathological specimens presented to the Society during the past year, the volume contains several monographs and reports of committees upon subjects of special surgical and anatomical interest.

Certain needs of the Society have been developed during the year: it needs a larger assembly room for its meetings, lectures, and demonstrations; it needs a fire-proof structure in which to secure its valuable museum and library; it needs more room to accommodate its present collections; it needs more room for its laboratories; it needs a more central location to make it more easily accessible; the peculiar character of its work renders necessary a special building to satisfy its needs; the securing of such a building the Society believes to be practicable. Such a building should be the medical centre of the city in which it exists, and in its erection should be combined the influence of all kindred societies whose home it should afterwards be.

THE CLINIC.

ATRESIA OF CERVIX UTERI.—Service of Dr. J. BYRNE, St. Mary's Hospital. A woman, aged about thirty, was delivered of her first child two years ago with instruments. She presented herself at the hospital with total occlusion of the cervix; menses retained; no portio vaginalis could be made out. Dr. Byrne, guided by the touch, made an incision, and established a channel through which she has freely menstruated since August, 1879.

THE Annual Report of Dr. P. L. SCHENCK, Medical Superintendent of Kings County Hospital, gives the titles of ninety operations, *in toto*, of which four were followed by death. The lethal cases were: Sept. 14th, 1878, operation for strangulated hernia; Feb. 23, 1879, intravenous injection of milk; Dec. 12, 1878, incision of femoral abscess, followed by death March 26; and, Dec. 19, removal of epithelioma with thermo-cautery, followed by death, March 2, 1879. All the others terminated in recovery. Among the noteworthy cases were:

Excision of knee joint, followed by amputation.

Removal of vomer, palate bones, and parts of the superior maxillæ.

Intravenous Injection of Milk.—One case treated with Colin's apparatus, and one in which the milk was injected by the force of gravitation. Both successful.

Incarcerated Hernia.—Successfully treated by aspiration.

Amputations of thigh, leg at knee, thumb, and eight toes on one subject.

Varices.—Eleven cases, treated by hypodermic injection of dilute liquor ferri subsulphatis, at two to six points.

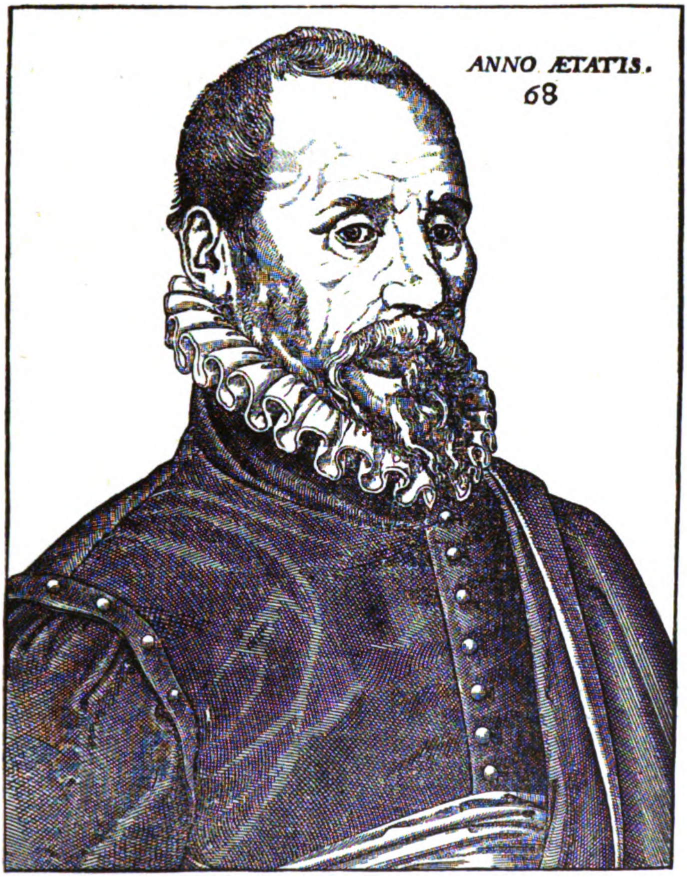
Hemorrhoids.—Five cases cured by the hypodermic injection of carbolic acid and olive oil.

Fistula in Ano.—Three cases treated with elastic ligature, four by incision, and two by incision and ligature.

STRANGULATED UMBILICAL HERNIA.—Operation. Death from Peritonitis on fourth day. F. H. HAMILTON. Female, aged 56 years; hernia existed for many years; truss never worn; November 25, 1879, developed symptoms of strangulation; extreme pain, vomiting, rapid pulse existing for twelve hours, tumor at umbilicus, size of small orange; seen by Drs. Figueira and Fowler, taxis ineffectual; six hours later seen by Dr. F. H. Hamilton; pain and vomiting had been allayed by hypodermic of morphia; taxis again ineffectual. Operation—tumor fully exposed, constriction in anterior sheath of rectus muscle, divided, impossible to empty sac completely; sac laid open, found to contain mass of omentum strongly adherent to wall of sac, encircling edge of sheath of rectus; more freely divided in other directions, and sac with its contents returned to abdominal cavity; patient rallied well; peritonitis with death on fourth day.

IN EFFIGIEM A. PARÆI.

Humanam AMBROSII *verè hæc pictura* PARÆI
Effigiem, ſed opus continet ἀμβροσίην.
IO. HEROALDVS.



IN EFFIGIEM A. PARÆI.

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Effigiem, ſed opus continet ἀμβροσίην.

IO. HEROALDVS.

VOL. II, No. 2. FEBRUARY, 1880.

ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

MEDIAN LITHOTOMY.*

By JAMES L. LITTLE, M. D.

PROFESSOR OF SURGERY IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF VERMONT; CLINICAL PROFESSOR OF SURGERY IN THE UNIVERSITY OF THE CITY OF NEW YORK.

AS far back as the earliest times of which we have any knowledge, the cutting operation for stone has been employed. The old Hippocratic oath made those who took it swear that they would never cut for stone, but leave the operation to be performed by those who occupied themselves exclusively with it.

As far as we can learn from history, the operation was performed in olden times in the same manner that it is at present, by the native surgeons of the East. The operation was called cutting on the gripe. The fingers of the left hand were introduced into the rectum, the right hand placed on the hypogastric region; and the stone was forced or pushed down towards the neck of the bladder. Holding it there with the fingers and thumb of the left hand, the operator made a curved incision across the perineum, through the tissues down to the stone, which could usually be felt externally; extracting it with a hook or a pair of forceps. Of course this operation was probably rarely done before the stone had assumed a formidable size so as to be easily felt.

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* Delivered before the Society, November 3d, 1879; reported stenographically by Mr. John E. Norcross.

This method of operating continued in vogue until the opening of the 16th century, when the Italian surgeon, Francisco di Romani, introduced the method of cutting into the bladder on a grooved staff, and his pupil, Sanctus Marianus published a treatise in 1535, in which he described the operation which was named after him, the Marian operation. By this method the incision was made in the median line, and in this resembles, in some points, the operation about which I am to speak to you this evening. A grooved staff was introduced into the bladder, and a cut made in the median line until the staff was felt; a probe or similar instrument was conducted by the groove of the staff into the bladder, and the neck of the bladder was dilated with dilators or blunt gorgets until it was sufficiently large to allow of the extraction of the stone.

The fatality after these operations was very great, because the calculi were in many cases allowed to attain a large size before the patient would submit to an operation. Hence great laceration and injury would be done to the neck of the bladder by the removal of the stone. This method of operating continued to be practised until the middle of the last century, when it was superseded by the lateral operation introduced by Mr. Cheselden.

During the present century new and improved methods of removing vesical calculi have been introduced. Lithotrity or lithotripsy was introduced by Civiale in 1834, and recently litholapaxy, by Dr. Bigelow, of Boston. During the same time modifications of the cutting operation or lithotomy have also been made, and among them the median operation, the subject of this evening's talk.

I will not have time to fully discuss the relative merits of the cutting and the crushing operations; I will state, however, that while all surgeons agree that some cases are suitable for lithotomy and others for lithotrity, the number for which the crushing operation is advisable is constantly increasing. The great tolerance of the bladder to the prolonged use of instruments in skilled hands, which has recently been demonstrated in the operation introduced by Dr. Bigelow, has narrowed the field of lithotomy considerably. A great many stones, that we formerly thought necessary to cut for, we now can crush, even if it takes a number of operations lasting several hours at a time. In my estimation there is no operation in surgery, not even excepting that for cataract, which requires more care, skill and practice, than the operation of lithotrity. I think it is far safer for the patient to have the stone removed by lithotomy, than to expose himself to lithotrity performed by unskillful hands.

I agree with Dr. Gouley and Dr. Weir in speaking of litholapaxy, that it is a more difficult operation than lithotrity and, one that should never be undertaken except by a good lithotritist. Although it seems an easy operation the danger is greater, because the patient is under the influence of an anæsthetic and cannot give evidence of injury by the improper manner of handling the lithotrite. Considerable practice on the cadaver should precede any attempt to use the lithotrite on the living subject.

To return to lithotomy: There are two classes of cases that, in my judgment, will be always suitable for the cutting operation; first, patients under fifteen years of age; second, patients who suffer from severe cystitis, and especially those whose stone is the result of the cystitis. With patients under fifteen it is difficult to introduce the instrument; the stone may be as large as any found in adults, and the difficulty in removing the fragments is so great, that the operation of lithotomy is the best for such patients, unless the stone should be extremely small. Where the stone is found to be not much larger than a pea, and a small lithotrite can be introduced, it is perfectly justifiable, I think, to crush it.

With the second class of cases, patients suffering from severe cystitis with contracted bladders, I think the cutting operation is always preferable. The manipulation of the instrument in the inflamed bladder, where the inflammation is not due to the stone, must of necessity aggravate it. It is possible that a further experience in litholapaxy in such cases may induce a modification of this opinion.

The best operation, in my opinion, for a case of cystitis, where the cystitis precedes the formation of the stone—not where the cystitis is caused by the stone, is the lateral operation; because it cuts through the neck of the bladder, and allows the urine to pass involuntarily through the wound, and thus gives for a time rest, to the bladder. In all cases where I have had this complication, I have in preference resorted to the lateral operation, and not only have relieved the patient from the stone, but also materially improved the cystitis.

In large oxalate of lime calculi, the great hardness of the stone causes difficulty in crushing. If you can ascertain that they are of this character, of course the cutting operation would be the better one. In cases where organic stricture is a complication, or where the patient has symptoms of kidney changes, there will be no hesitation I think in choosing lithotomy. Further experience may favor litholapaxy in these last mentioned cases, especially those complicated with stricture, as this may be divided at the time of the operation. The stone may then be crushed, and all the fragments removed.

A few words with regard to the various methods of cutting for stone. There are three principal operations in vogue at the present time, the lateral, the bilateral, and the median; so named from the line of the external incision. In the lateral operation the incision is made on the left side of the perineum; in the bilateral, it is made across the perineum, and in the median operation it is made in the central line. The lateral and the bilateral, have one feature in common, by which they essentially differ from the median, namely, the neck of the bladder and the prostate gland are divided to a certain extent, while in the median operation the incision extends only through the membranous portion of the urethra, the neck of the bladder being dilated.

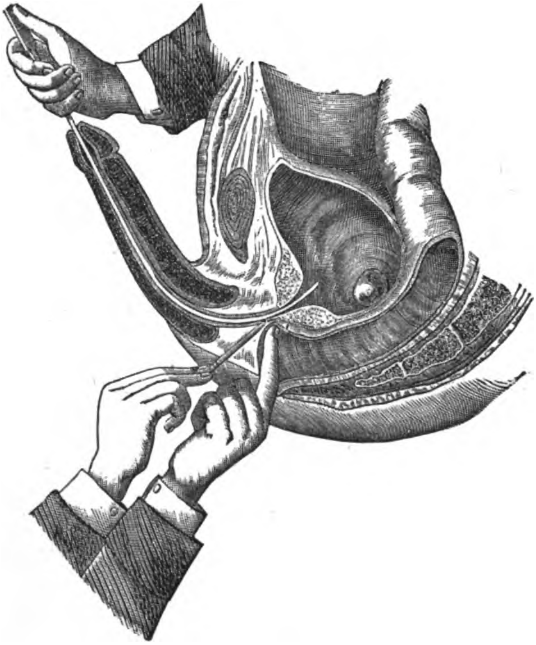


FIG. I.

The median operation was brought into prominence by Mr. Allarton. In 1854, he published a pamphlet entitled, "Lithotomy Simplified." The operation as described at that time, is the one to which I will now call your attention. It is performed in this way. A staff is introduced into the bladder, and is held by an assistant well up against the pubes, the surgeon then introduces the forefinger of the left hand into the rectum, and rests it against the apex of the prostate gland. A long slender knife is then introduced in the raphé of the perineum from a half to three-quarters of an inch above the anus, with the cutting edge upwards, and pushed inwards until its point reaches the groove in the staff (Fig. 1), then an incision is made directly upwards. The point of the knife incises the urethra to a certain extent, and elevating its handle on its withdrawal, the soft parts are cut so as to make the external incision about an inch in length. Then a director, probe, or any straight instrument of the kind, is introduced on the staff through the wound, and is passed along the groove directly into the bladder, the accomplishment of which, is usually indicated by the urine passing from the wound.

The staff is then withdrawn, and the surgeon holding the director with his left hand, oils the index finger of his right, places it on the director and is guided by it to the neck of the bladder, which he carefully dilates until the finger

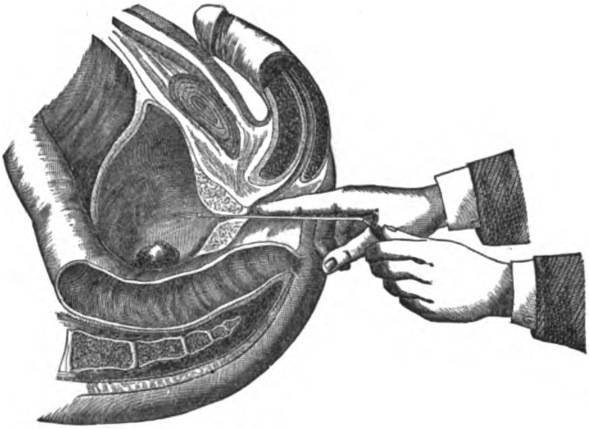


FIG. 2.

enters the bladder and the stone is felt (Fig. 2). Both finger and director are now removed, the forceps introduced, and the stone seized and extracted. If the stone be too large to be removed in this way, we introduce a lithotrite or other instrument for crushing, and seize the stone and break it; then with the forceps or scoop extract the fragments. This constitutes in a few words the median operation.

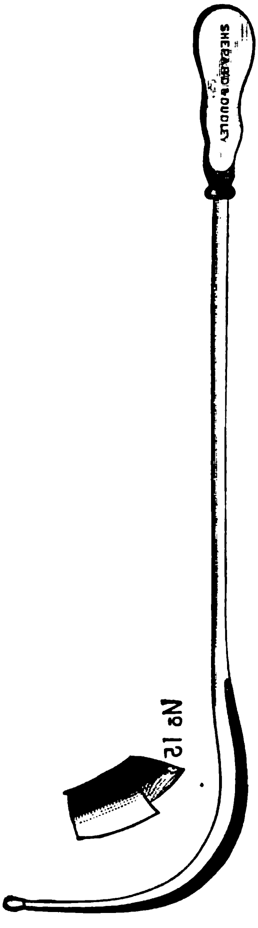


FIG. 3. THE STAFF.

In performing the median operation it is necessary to use a certain number of instruments, and to them I will now call your attention. The ordinary staff used for lateral and bilateral lithotomy is not a good one to use in this operation, because the groove has an abrupt termination, which is very necessary where you perform the lateral or bilateral operation, but for the median operation it is an interference with the passage of the director through that groove into the bladder. For that reason I have devised a staff which is not open to that objection. It is made with a very deep groove, so that the knife will have but little difficulty in reaching it, and incising the urethra. One other thing: there is no abrupt termination to the groove, so that the director will pass into the bladder without interception. I have adopted the principle which is taken from the French instruments, having the curve bulge out as much as possible, thus making the staff prominent in the perineum, so as to be easily reached by the knife. The groove being deep, a greater portion of the knife passes through the urethral wall, thus giving a good purchase on the urethra, so that the knife is sure to cut to the desired extent.

I was led to devise this form of staff with a deep groove by experiencing some difficulty in one of my earlier operations. The groove of the staff I used at that time being shallow, the point of my knife failed to make a free incision in the urethra. In attempting to introduce my finger into the bladder on the director the urethra was torn almost completely across, and a stricture followed: The patient was about four years of age. After the operation a fistula was left in the perineum with a stricture of the urethra in front. External urethrotomy was successfully performed and the patient entirely recovered.

I will now describe the knife. An ordinary finger knife will answer the purpose, but it is much better to have one with a long handle. A straight knife will reach the groove very well, but if you have one with the handle lengthened so as to rest upon the space between the finger and thumb, you can so much the better direct the knife to the staff. I might say here this is a part of the operation which is sometimes attended by a little difficulty. In one case I missed my staff, and went in some distance deeper than the staff. I felt anxious about the case but no bad symptoms followed. Now, if I do not feel the groove distinctly I take a scalpel, cut in the median line, and as soon as the groove is felt I puncture, and cut directly upwards. This is the knife, devised after Mr. Allarton's description (Fig. 4); it has a lancet-shaped point, passes in nicely, and makes a good incision provided it is sharp.

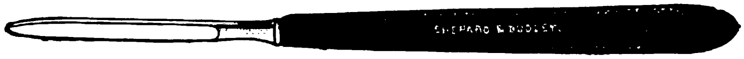


FIG. 4. THE KNIFE.

This director (Fig. 5), is another instrument of my own. It is simply a grooved, straight director with the handle bent downwards and with a little button at the extremity by which it can be guided along the staff into the bladder without any trouble; upon this, dilatation can be easily made with the finger.

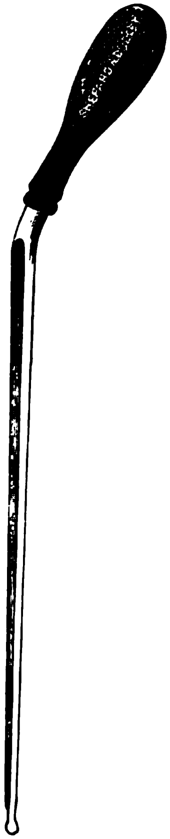


FIG. 5. THE DIRECTOR.

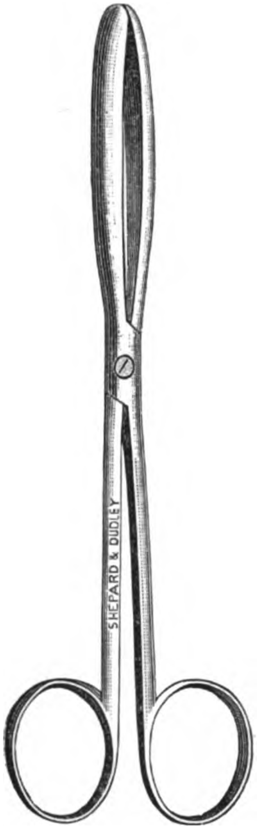


FIG. 6. THE FORCEPS.

The forceps for extracting the stone which I now show you (Fig. 6), are those which I prefer. They are much better than those which dilate the most at their extremities. This kind dilates the opening as the stone is being extracted, while the other form to which I have alluded is apt to become buttoned behind the neck of the bladder, if the parts are at all rigid. Sometimes you can feel the calculus with your finger, but when you take your finger out and introduce the forceps you find you cannot seize it. If you can only get your forceps in with your finger there will be no trouble in seizing it. For that reason, I sometimes use the ordinary polypus forceps, with which I have

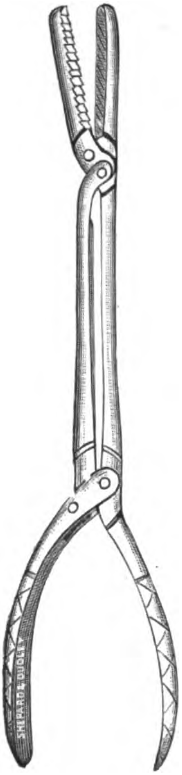


FIG. 7.
GOULEY'S CRUSHER.

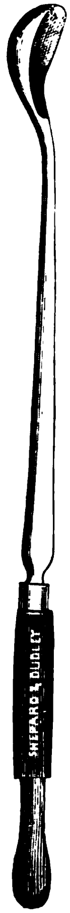


FIG. 9.
THE SCOOP.

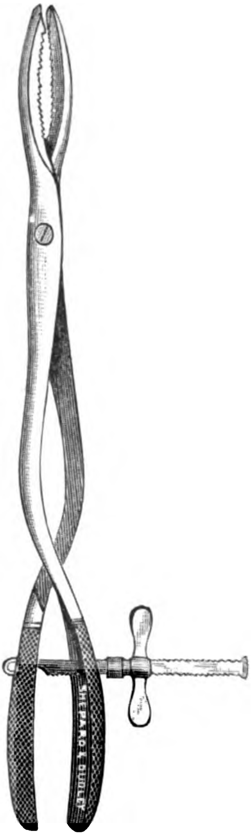


FIG. 8.
SCREW CRUSHER.

removed a great many of the smaller calculi. Unless the stone be small it is safer to introduce the crusher and break it, and then remove the fragments. Thompson's or Bigelow's lithotrite will answer for this purpose.

Dr. Gouley has devised this instrument for the same object (Fig. 7). This (Fig. 8) which I hold in my hand I have frequently used. If the stone be very large and hard I think it is the best instrument, as the screw can be used. The larger fragments may be removed with the forceps. This scoop (Fig. 9) which I show you is very useful in removing smaller fragments. I have also often used it in removing small calculi by passing my finger along its side and pushing the stone into the scoop, holding it there until it is pulled from the bladder.

So much for the instruments we use in this operation—the staff, the knife, the director, the extracting forceps, the scoop and the crusher.

A few words on the advantages of the median operation over the lateral and the bilateral:

First.—The ease with which the bladder is reached.

Second.—The incision being made in the median line, no muscles are cut, and no vessels of importance wounded.

Third.—The neck of the bladder and the prostate gland are uninjured.

Fourth.—There is no danger of wounding the rectum.

Fifth.—The patient usually retains control over his bladder after the operation—a matter of considerable importance, inasmuch as it adds to the comfort of the patient.

After the operation for lateral lithotomy, you know, where the neck of the bladder is incised, the urine runs from the bladder for a long time, the patient having no control whatever over it.

With the median operation, in nearly all my cases the patients have had complete control over the bladder immediately after the operation, so that I always expect them to do as the little boy did whom some of the gentlemen present saw me operate upon at my clinic in the New York University the other day.

About six hours after the operation he wanted to pass water, and did so, all the urine passing naturally through the urethra, owing to the swelling about the wound. The next time the patient passed water, part of it came through the urethra, but most of it came through the cut. From that time, for some days all the water passed by the cut; but as soon as the wound began to heal, part passed by the cut and part by the urethra, until the wound completely closed, and thereafter the urine passed entirely by the natural channel; but during all this period the patient held his water from two to four hours at a time, and would call for the vessel in which to pass it.

Anatomically considered, this is certainly, I think, the best method, because there is less injury done to the parts than by the lateral or bilateral operation. In both of these methods the prostate gland is incised, and it is still an open question as to the extent of damage done to the virility of the patient. In this respect, the injury done to the gland by the bilateral method will, of course, be greater. In the lateral operation the prostate is cut on one side; in the bilateral on both sides; so that if there is any harm done to the virile powers of the patient, it seems to me to be greater in the bilateral than in the lateral operation. It would be extremely interesting if we could follow up our cases and ascertain the result as regards the injury done to this power in the different classes of operations. I think in the median operation but little damage is done; none at all, in fact, except in attempting to remove large stones intact, when the neck of the bladder may be torn. If you perform the operation as intended, no damage is done to those parts which enter into the generative process.

I might speak of another operation called Dolbeau's operation, or perineal lithotrity, and which was brought to the notice of the profession by Professor Dolbeau, of Paris, in 1862, eight years after Mr. Allarton had revived the modified median operation. It is simply the method of Mr. Allarton, except that M. Dolbeau, instead of dilating the neck of the bladder with the finger, uses an instrument for that purpose. Mr. Allarton at first used his finger, after that he tried dilators, but in his last work, "Lithotomy Simplified," a larger work than the pamphlet I alluded to previously, he states that he knows of no better dilator than the finger, and no other dilator is necessary. M. Dolbeau claims that the neck of the bladder can be dilated with safety up to about the size of the ordinary index finger, and that for this purpose he uses an instrument, which is called the dilator of Dolbeau. It is passed in along the groove of the staff until the point enters the bladder, and then by a screw the blades spread and dilate to an extent not larger than the finger. It is called Dolbeau's operation simply because he does that. He then removes the stone if it is small enough to come through; if not, he crushes. Probably he would crush many stones that Mr. Allarton would remove whole, but the operations are essentially the same. It might as well be stated that M. Dolbeau does not even mention Mr. Allarton's name in the work he has written on this subject.

Up to the present time I have performed the operation thirty-two times with but two deaths. The ages of the patients were as follows:

Under		5	years,	13	cases.
Between	5	and	15	"	10	"
"	35	"	40	"	4	"
"	40	"	50	"	1	"
"	50	"	60	"	2	"
"	60	"	70	"	2	"

The youngest two were nineteen and twenty months of age, the oldest sixty-five and sixty-seven years. All of these were cases in which I thought that lithotrity was not admissible. The fatal cases were patients fifty-six and sixty-five years of age respectively. The cause of death in the patient fifty-six years of age was peculiar. The patient was sick with typhoid symptoms. His physician finding him suffering from some difficulty about the bladder, sent for me; I examined and found a stone, but refused to operate, as it seemed to me the patient was in such a condition that no operation was justifiable, but a few days after a consultation was called, and the patient in his weak condition insisted on having the stone removed. After talking over the matter, it was thought advisable to give the patient the benefit of the operation, and I performed it. On cutting down I came to this very peculiar stone (Fig. 10). It is flat and triangular in shape as you see. The corners are rounded, and one of them presented at the neck of the bladder, and seemed to be a stone of moderate size. I was unable, on account of the depth of the perineum, the patient being a large man, to get my finger well into the bladder. I seized it with my forceps, and from the grasp judged it to be small. It came out without using much force. I then found that I had seized it by its smallest part, and that its real size was large, the greatest diameter being 49 millimetres ($1\frac{15}{16}$ inch). The patient felt relieved of his bladder symptoms, but died on the third

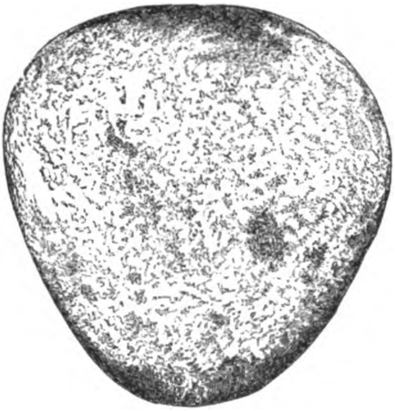


FIG. 10.

day after the operation from typhoid symptoms. On post-mortem examination I found the neck of the bladder considerably lacerated, with more or less extravasated blood in the vicinity, although not as much as I expected, considering the size of the stone and the rigidity of the opening.

The other case of death was a man 65 years of age, who had suffered from stone for many years. Lithotrity had been tried, but as it caused great pain the patient would not allow the operation to be again tried. He then put himself under the charge of some one in New York, who promised to dissolve the stone by internal remedies. Finally he came to me. I examined the urine, found a certain amount of albumen in it but no casts, and I operated upon the patient. I found two calculi. This patient had no bad symptoms from the operation, except some slight vesical tenesmus, which occured during the first twenty-four hours, until the third day, when he complained of a severe pain in the right lumbar region. In a few hours after the beginning of this pain, a large ecchymotic spot appeared in this situation and was incised; there seemed to be more or less gas in the cellular tissue. The pain was so severe that several hypodermic injections of morphine were administered in various parts of the body; these were always followed in a short time by hemorrhagic spots, as large as my hand; the patient sank, became comatose and died on the evening of the third day. He died at seven o'clock in the evening, was put on ice immediately as it was warm weather. The next morning at seven o'clock I went to make a post mortem examination, and found the body in the most advanced stage of decomposition that I had ever seen occur in the same space of time; it was green and bloated, so that it was impracticable to make the examination.

In these operations I have had no troublesome hemorrhage whatever. In two cases I have been annoyed from two to four hours after the operation with severe vesical tenesmus. This was alleviated in one case by passing a soft catheter through the wound and keeping it in for a few hours; the other case was relieved by the patient making a terrible strain and passing a large clot of blood. These are the only cases in which this symptom appeared. In one case to which I alluded in the early part of my lecture the operation was followed by stricture; in that case I had difficulty in entering the bladder, and the urethra was torn partially across. This was relieved by external urethrotomy, bougies and sounds were passed, and the patient got entirely well. The child died two years afterward of scarlet fever, so I cannot tell whether that stricture would have returned, as traumatic strictures usually do.

In only one case of the thirty-two have I had a perineal fistula remain. In this case the boy soon after the operation had an attack of scarlet fever. For some reason, after he got over that, the wound remained open and made no attempt to heal. It seemed to be almost as large as it was at the time of the operation. Gradually he improved sufficiently to leave the hospital. The fistula remained open for nearly a year and a half. It however gradually closed of its own accord completely and thoroughly. You know a fistula is not unusual after the operation for lateral lithotomy, but among all my cases by the median operation this was the only one that occurred.

As regards the size of the stones, the one I showed you a moment ago is the largest in diameter that I have removed whole. In nearly all the other cases where the stone was of large size I crushed it before removal. Here is a large stone which was seized in its smallest diameter, 37 millimetres (1½ in.), and brought through the dilated neck of the bladder without the slightest trouble, leaving no bad symptoms. This is probably the largest stone I have removed, though not the largest in diameter (Fig. 11).

In form it looks like a meerschaum pipe. It is 87 millimetres (3½ inches) in length, and the diameter which passed through the wound is 37 millimetres (1½ in.). It is a phosphatic calculus. A large part of the longer end of the stone occupied the prostatic and membranous portions of the urethra. The patient of course had no control over his bladder, his urine dribbling from him constantly. The stone could be felt by pressing against the perineum. I was not able at the time of the operation to pass my staff into the bladder, and had to have it held at an angle. I could easily have cut on the gripe and removed it. I did not consider it necessary to crush it before attempting its removal, because a large part was protruding from the bladder. On seizing it with the forceps, it came out with but little traction.

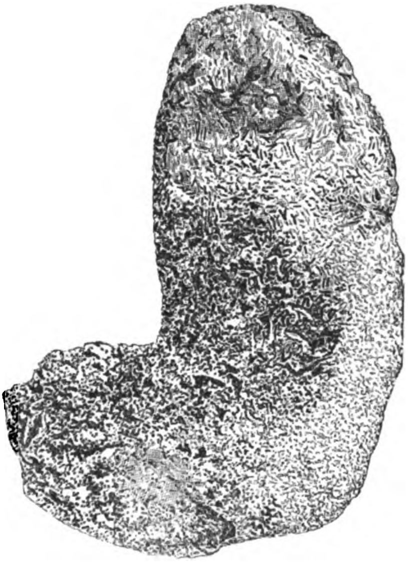


FIG. 11.

Strange to say, the man had been within two months before he came to me, to three physicians in the city of New York, two of whom passed in an instrument and did not find the stone, though they could have felt it from the outside without any trouble. This patient recovered, with complete control over the bladder. Of course for some time after the water dribbled away, as it would do in cases where lateral section had been made.

I will show another specimen of some interest, an oxalate of lime calculus, which came from the boy who had the fistula remain for some time. It is quite rough. One feature about it is somewhat curious: when I removed the stone I was much surprised to find it so rough, as he had had very slight symptoms of stone. An English surgeon, who had been stationed in India, told me at the time of the operation that it was not unusual to remove stones of this character in India, and that it was found that rough stones frequently gave less trouble to the patient than smooth ones. When this stone was brought out it was coated with a thick layer of tenacious mucus, and consequently was smooth while in the bladder and less irritating than a smooth stone, to which no mucus would adhere. He stated that the fact had been noticed there; I have not seen it alluded to in any authority or work on the subject.

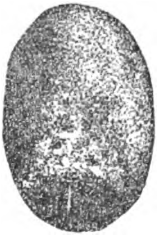


FIG. 12.

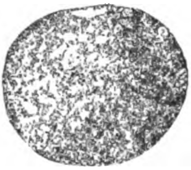


FIG. 13.

Here is a stone which I removed from a child nineteen months old, 24 millimetres ($\frac{15}{16}$ in.) in diameter (Fig. 12). Here is another from a child of twenty months, 20 millimetres (¾ in.) in diameter (Fig 13). Two others, from a boy ten years old, are interesting in this respect. The mother called at my office about eight o'clock in the evening, and told me the child had difficulty in holding its water, and some trouble in passing it. I at once suspected stone, put the little fellow under an anæsthetic, laid him on my table, and found a calculus. I told the mother there was a stone in the bladder, and it was best to let me operate at once. She consented. I cut and removed these two calculi. The child went home, and it is the only case I have had where the internal portion of the wound healed by first intention. This child never passed a drop of water through the wound after the operation. Two days after the child was up and running round the room, passing water through the urethra, with the external wound almost entirely healed.

I have here two large calculi, which are somewhat interesting. These stones were dovetailed together, and the patient told me, as he moved around he could feel them move upon each other. On inspection after removal, I found two facets, polished like ivory, where the stones came together. In another case the median operation was performed and the stone crushed; no bad symptoms occurred until six or eight weeks after, when he gave evidence of another stone. I again performed the operation by reopening the wound and took out a soft phosphatic calculus. The bladder after the first operation was thoroughly explored with the finger, not only by myself but by other surgeons present, and no fragments detected; still within a few weeks I removed a stone which was more than an inch in diameter. The fragments are here. I believe that a fragment had been left behind in some part of the bladder, because it would have been impossible for a stone of this size to form in so short a time.

Shortly after that, in 1874, I operated on a little boy, about eight or ten years of age, crushed a stone and removed the fragments. After I got through with the operation I allowed two distinguished surgeons who were present to examine the bladder with their fingers, and they were satisfied that no fragments remained behind. For some reason, after they had left the house, I had occasion to put my finger in the bladder again, and I found a large fragment up behind the pubes which had entirely escaped our examination, so that from that time I have always been careful in making an examination of the bladder with my finger to pass it directly upwards behind the pubes, to see if any fragments remained; it is a place where they frequently become lodged. During the examination for stone you frequently miss it because it is in that position. At the operation at the University two weeks ago, I had an instance of this; my incision in the membranous portion was not made large enough, and in attempting to introduce my finger I found it so small that I would tear the urethra if I attempted to push my finger into the bladder, so I simply introduced the forceps which went in readily along the groove of the staff. I have frequently done this. With children I do not always put my finger into the bladder, but as soon as I find the director is in, I pass in the forceps hoping to seize the stone, and dilate as I withdraw. In this case I felt around for ten or fifteen minutes but could not find the stone, and I began to feel afraid I was not in the bladder; I grew nervous over it, but I took this pair of curved polypus forceps, passed it in, and bending it up in this way I found the stone right behind the pubes, brought it down, seized and withdrew it.

There are a good many stories connected with the other cases, but I will not detain you with them. I wish to speak of an accident I once witnessed and which, I think, is worth remembering. A young physician who had frequently assisted in this operation, and had seen it done many times, had a case come under his care and decided to operate. I stood by and held the staff. He cut down, and passed the director into the bladder. In passing his finger in as is usual to dilate the neck of the bladder, he pushed on, as I noticed, very rapidly and very hard. After a few moments he said, " I cannot find the stone." I put my finger in and at the first moment I said, "You are not in the bladder," I examined again, passed in the sound, examined again and again, and finally, I must confess I made up my mind he had entered the bladder, but no stone could be found. The next morning the patient passed water from the wound, but in the afternoon, peritonitis appeared and the patient died. I made a post-mortem, and found that the operator's finger had passed up between the bladder and the abdominal wall. The patient was a little child, only three years old, and the forcible pushing of the finger, had caused the urethra to give way. It was surprising what a cavity he made by working his finger around in that short time. The cavity was so marked that after examining it for some minutes I felt almost positive that it was the bladder, but there was one point about it which led me to have some suspicion; I could feel something pushing down upon my finger when the child breathed, and when I found that peritonitis had developed, I was satisfied that this was the fold of peritoneum where it passes from the bladder to the abdominal wall, and that the bladder had never been reached. The post-mortem showed the difficulty, and in the bladder was found the stone. That occurred six or eight years ago, and from that time I have been extremely careful in pushing my finger along the director into the bladder, especially if I do not feel that I have cut the urethra sufficiently. That is the reason why in the operation in the clinic two weeks ago I did not force my finger into the bladder; I could feel the urethra was not cut enough, consequently I did what is best to do in such a case, passed in the forceps, seized the stone, and withdrew it. I do not know but that in many cases with children the insertion of the forceps is just as well; the only advantage of the finger is that if the stone is lodged anywhere you can feel it, and push it down in a position to be easily removed.

The best instrument to search for stone is Thompson's, because it has a short curve. A great many stones are sought for and not found because the surgeon uses an instrument with a very long curve, and as that passes upwards he sounds the upper portion of the bladder only, and is not able to get it around behind the prostate and feel the stone if there. The advantage in using this instrument is that you can turn it completely around, and if the calculus is lying behind the prostate, it can readily be felt. I will now close by demonstrating the operation upon the cadaver.

Society Reports.

STATED MEETING, OCTOBER 13TH, 1879.

The President, Dr. L. S. PILCHER, in the Chair.

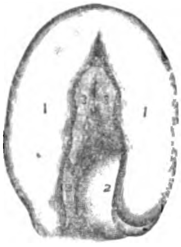
HYPERTROPHY OF THE LARYNX.

Dr. Thomas R. French presented a patient before the Society, and with the aid of the laryngoscope demonstrated his condition, accompanying the demonstration with the following remarks:

This is a case of strumous hypertrophy of the epiglottis and laryngeal structures causing stenosis of the larynx. The patient is 17 years of age, of marked strumous habit, which, beside the condition that I propose to demonstrate, is evidenced by general hypertrophy of one tibia, nasal and pharyngeal catarrh, weak eyes, stunted growth, and impaired nutrition. He came to my clinic at the Long Island College Hospital on January 22, 1879. He had been suffering with the same symptoms as then complained of, for two months.

His symptoms and condition at that time were very much as they are now, viz., dyspnœa accompanied by stridulous breathing, cough and loss of voice.

On examining with the laryngoscope it will be seen that the epiglottis is very much enlarged and in shape resembles a horse shoe. The glottis is much decreased in size because of thickening of the laryngeal walls, leaving only an irregular triangular opening, about the size of a goose quill. The arytenoids are both enlarged, especially the left. The mucous membrane is pale, and the whole of the thickened tissue firm to the touch. The accompanying sketch shows the appearance of these structures as seen in the laryngoscopic mirror. The only treatment which would be of any service in this condition is tracheotomy.



1. Epiglottis.
2. Arytenoid cartilages.
3. False vocal cords.

I have repeatedly urged both the patient and his parents to allow me to introduce a tube into the trachea, but, professedly because of the fear that he will die during the operation, their consent has been refused. My opinion and advice was concurred in by Dr. Pilcher, who saw the case with me some time since. You can all appreciate, from the amount of dyspnœa now present, that the danger of suffocation is very great. The slightest swelling of the tissues about the glottis from inflammation or œdema, would carry him off very speedily. Hypertrophy to the degree here present, is rarely met with, this being the only case that has come under my observation.

Addendum.—On November 20th, the subject of the above report was attacked with extreme dyspnœa, and because of my absence from the city, Drs. B. F. Westbrook and C. E. Delavergne were called to see him. Tracheotomy was advised and consented to, but before the necessary instruments could be obtained, the patient died from asphyxia. The post mortem examination was made by Drs. B. F. Westbrook and Jarvis S. Wight. Dr. Westbrook presents the following report:

Autopsy made eighteen hours after death. The larynx and upper half of trachea were removed. The epiglottis was very much thickened and so changed in structure as not to resemble the normal organ; the surfaces were rough, wrinkled and very light colored, the section resembling bacon; the same change had affected the entire laryngeal mucous membrane; the new formation had caused such swelling that the glottis posteriorly was completely closed, and the vocal cords so nearly approximated that only the flat handle of the scalpel could be introduced between them; the true vocal cords were thickened and had lost their usual sharp outline, a fact particularly noticeable at their ends; the thickening of the superior vocal cord and the adjacent parts was so great on the right side as to nearly close the ventricle, whose cavity was not more than half its normal size; on the left side the entrance to the ventricle was obstructed by the approximation of its sides, but it could be readily opened; the same thickening extended throughout the inferior portion of the larynx and for three to four centimetres down the posterior wall of the trachea gradually shading off into the normal tracheal mucous membrane; the trachea however was not sufficiently obstructed to have interfered with the introduction of a tube; passing the finger down to its bifurcation no further stenosis could be felt. The whitish baconlike appearance was due to the development of connective tissue, and to the naked eye resembled the tissue of elephantiasis.

INTERNAL STRANGULATION OF THE ILEUM.

Dr. H. F. Williams reported the following case:

W. G., a robust man, aged 24 years, was awakened early in the morning of October 5, 1879, by colicky pain in his bowels, followed by a copious loose evacuation; pain continuing, a dose of rhubarb and magnesia and some brandy was taken; pain continued to become more severe. Was first seen by Dr. Williams in the evening, who found him suffering greatly from pain, which he located at a distinct point in the epigastric region; the stomach was somewhat distended with gas; no abdominal tenderness present. Opium was given, bringing such relief that when left by the doctor he was free from pain and had a strong pulse, 58 per minute. The following morning he complained of slight intestinal uneasiness; no movement of the bowels had occurred; a copious enema of warm water and soap was given without effect; by evening pain had become great, and was now located in centre of hypogastric region; percussion sound along the course of the large intestine was tympanitic, but duller over small intestine; pain constant, with paroxysmal exacerbations; no tenderness on pressure; patient restless; enema was repeated without effect; opium given by the mouth was rejected, but no trouble was experienced from vomiting otherwise; hypodermic of Magendie's solution given, with the result of relieving the pain. When left by the doctor this second night the patient was comfortable; pulse, 50; temperature, 37.2° (99° F.); at 5 o'clock the next morning the patient was found suffering much paroxysmal pain, though distinctly under the influence of opium; bowels had not moved; there was distinct dullness over the cæcum, with tympanitis over small intestines. Was seen in consultation by Dr. Pilcher, a diagnosis of intestinal obstruction of uncertain character was agreed upon, and an attempt to overcome it by large enemata determined upon. If this failed, abdominal section was advised; stimulants were to be freely given, and opium as needed. This course was pursued during the morning without relief; the patient rapidly sank. A second consultation was held at 1.30 P.M., at which Drs. Pilcher, Jewett, Fowler and Rockwell were present. The patient was found in extreme collapse; his intellect was clear, and he was ready to submit to any operation advised, but his condition had now become so extreme that it was evident to all that he could not survive any operation. Stimulants were given freely, but he continued to sink, and died at about 3 P.M., fifty-seven hours from the beginning of the attack.

There was no stercoraceous or persistent vomiting at any time. At the autopsy the following condition was found: Small intestines distended with gas, and throughout their whole extent notably congested; a loop of small intestine, comprising fifty-one centimetres (20 in.) of the lower part of the ileum, was intensely congested, of dark livid color, having become strangulated in the following way: From the free border of the ileum about five centimetres from its termination in the cæcum extended to the adjacent surface of the mesentery, with which it blended, a strong thin fibrous band, evidently the result of an old inflammatory adhesion. This band was about two centimetres in length; to it a portion of the great omentum was also firmly adherent; thus a foramen had been formed with a diameter of about two and a half centimetres, and with firm strong margins, through which a loop of the ileum had slipped and wedged itself in, until complete strangulation had been caused; the bowel, where it was nipped by the ring, was tightly twisted upon itself; the strangulated loop was distended with gas; careful and prolonged attempts to disengage it from the ring by traction and taxis were unavailing, until its distension was relieved by puncturing it. The large intestine was empty and healthy; the remaining abdominal viscera were healthy. The patient, when six years old, was ill with what was then said to be inflammation of the bowels; no other cause can be assigned for the adventitious fibrous band formed. He had also been troubled much with dyspepsia and constipation for a number of years previous to his fatal illness. In the light of the autopsy it is clear that from the first abdominal section would have been the only resource which could have been of any use; yet the symptoms were so slight and vague that the performance of such an operation previous to the time when it had become too late, would not have been advocated even by such warm advocates of the operation as the consultants in the present case.

RUPTURE OF OVARIAN PAMPINIFORM PLEXUS: FATAL HEMORRHAGE.

Dr. Geo. R. Fowler presented an ovary with a portion of the enveloping broad ligament, including the pampiniform plexus of veins, in one of which there was a small rent, with the following history:

Mrs. D., aged 30 years; cessation of last menstrual period, Aug. 1, 1879. During the evening of August 22d she experienced a sudden pain in the region of the left ovary, of short duration; this recurred the next morning while she was at breakfast, and symptoms of profound shock rapidly developed. When seen by Dr. Fowler, shortly afterwards, she was pallid and nearly pulseless; complained of circumscribed pain in the region of the left ovary; her abdomen was swollen, and plainly contained much fluid. A diagnosis of internal hemorrhage was made, and opium and gallic acid administered. The patient rallied, and there was no recurrence of the hemorrhage. The next morning symptoms of acute peritonitis developed, followed by death on the third day.

At autopsy the peritoneal cavity was found filled with fluid and clotted blood; the usual evidences of general peritonitis were well marked. A prolonged search revealed no other source of hemorrhage than the ruptured vein seen in the specimen presented to the society. The uterus was perfectly normal: there was no traceable immediate cause for the rupture; its first occurrence and its recurrence took place when the patient was quietly sitting; coitus had not been indulged in for several weeks previously.

TUBAL PREGNANCY.

The following series of specimens, illustrating the conditions attending rupture of the sac in tubal pregnancy, was then presented:

CASE 1, presented by Dr. G. A. Evans.—History; Mrs. H. aged 27 years; general health, good; married five weeks; was seized suddenly, January 17, 1879, with severe lancinating pain in the right iliac region, followed by syncope. Pain became continuous, and was accompanied by general prostration and marked tympanitis. Opiates, turpentine enemata and brandy were given, and good reaction obtain, so that seven hours after seizure she was cheerful, and her natural color and pulse had returned, though some pain was still felt, which she endured without much complaint. Six hours later was seized with persistent vomiting, which continued for six hours more, and terminated in collapse and death nineteen hours after occurrence of first symptoms. At autopsy pelvis was found filled with a large clot of blood; the uterus and appendages were removed, and are here presented for examination. The uterus is enlarged, and about the size proper to the fourth week of pregnancy; it is filled with a decidual mass, but contains no chorion tissue or embryo. The right fallopian tube presents a dilatation at about its middle, in which is a ragged slit about one centimetre long; partially protruding through this is a mass composed of chorion tissue and a fœtus of about four weeks' development, surrounded by its membranes. The left fallopian tube is normal.

Cases 2 and 3, presented by Dr. Thomas Wilde.

1. History; multipara, aged 35 years; still nursing youngest child, then about one year old. Had noticed for some weeks slight uterine hemorrhages. Was first seen by Dr. Wilde July 4, 1872, being then in collapse with symptoms indicating internal hemorrhage. Death occurred at end of four hours after. At autopsy peritoneal cavity was found distended with blood; a perfect ovum of about six weeks' development was found in the retro-uterine *cul-de sac*, and is presented with the uterus and its appendages; the uterus is considerably enlarged, and contains a well developed decidua. The right fallopian tube presents a saccular dilatation about two centimetres from its fimbriated extremity, in which is an extensive rent.

2. History; recently married young woman; date of cessation of last menstrual period, August 3, 1872; while running up stairs on the morning of August 25th following, felt as if something had given way within the pelvis, which sensation was soon followed by faintness. At the end of three hours, when first seen by Dr. Wilde, had the appearance of one suffering from severe hemorrhage; the only pain complained of was in the left shoulder; the abdomen evidently contained a large quantity of fluid. In the light of the previous case, which had occurred within two months, the doctor diagnosticated the case as one of hemorrhage from extra-uterine pregnancy. No operative measures were adopted, and the patient gradually sank and died at the end of ten hours from the occurrence of the first symptom of trouble. At

autopsy the peritoneal cavity was found distended with blood; the uterus and its appendages were removed, and are here presented. The uterus is but slightly enlarged; the fallopian tube, about a centimetre and a half from its uterine termination, presents a small spherical dilatation; on the upper surface of this is a small round opening, as if a portion of the wall had been cut out with a punch, by which a small ovum is exposed intact within the sac; the development of the embryo is not beyond the third week; the very early period at which rupture occurred makes this specimen one of very great rarity.

CASE 4, presented by Dr. I. H. Barber.—History; Mrs. S., aged 22 years, mother of one child two years old; six weeks after cessation of last menstrual period, August 13, 1877, was attacked with pain in the abdomen, accompanied by diarrhœa and vomiting. Was seen by Dr. Barber on the following day, when she was already in collapse. Death occurred at end of three hours thereafter. She had enjoyed the best of health until this attack. No uterine hemorrhages had occurred. At autopsy the peritoneal cavity was nearly filled with coagulated blood; the uterus and its appendages were removed, and are here presented. Within the uterus there was about a half teaspoonful of blood; the organ is enlarged, and about the middle of the left fallopian tube there is a spherical dilatation, in the wall of which there is a ragged rent of some size. The duration of the pregnancy could not have exceeded six weeks.

GASTROTOMY AFTER RUPTURE OF THE SAC IN TUBAL PREGNANCIES.

Dr. JOSEPH H. HUNT remarked as follows:

A series of cases have been presented to the Anatomical and Surgical Society during the current year, which have involved the consideration of the propriety of gastrotomy in their treatment; these have included ruptures of the uterus, nephro-lithiasis, strangulated hernia, internal strangulation of the ileum, organic stricture of the ileum and impacted biliary calculus, in addition to the series of cases now before us. I invite attention to some points bearing on the propriety of gastrotomy in cases of internal hemorrhage attending extra-uterine pregnancy. The impossibility of making a certain diagnosis of the existence of extra-uterine pregnancy in the early months, excludes from consideration the propriety of the operation as preventive of hemorrhage, although it seems to me that if a reasonably certain diagnosis could be made in any case, there would remain no question about the necessity of attacking the ovum in some way, either by abdominal or vaginal incision, or by electrolysis.

The termination of tubal pregnancy with very rare exceptions is death either immediately from the loss of blood, or from the shock caused by the presence of the blood in the peritoneal cavity, consequent upon the rupture of the sac, or later from peritonitis, and this usually between the fourth and twelfth week of the pregnancy; the earliest case of rupture mentioned by Parry in his work on extra-uterine pregnancy was at three weeks; one of the cases reported here by Dr. Wilde adds another to the number of ruptures at this period; this uniformly fatal result seems still more terrible from the fact that these women are stricken down in the midst of apparent perfect health.

Rogers [extra-uterine foet. and gest., Philadelphia, 1867, p. 41], asserts most positively that no case of recovery after rupture has been recorded, and that we have no evidence whatever that it can occur. Whether this be true without exception or no, it is sufficiently true to establish the proposition that the physician cannot permit the hope of recovery without interference, to influence his decision in the adoption of a plan of treatment. There are two conditions with which a surgeon may find himself confronted in these cases; he may see his patient while the hemorrhage is active, or in some instances when it shall have ceased, and the peritoneal cavity is occupied by a quantity of blood.

Whatever the case, the indications for treatment are clear and positive; spontaneous arrest of the hemorrhage, even should it occur, diminishes but little the danger, the arrest complete and final of the bleeding, and the removal from the peritoneal cavity of the contained blood must both be accomplished, and these demand imperatively abdominal incision. The diagnosis of the existence of hemorrhage into the peritoneal cavity is usually not difficult; in three of the four cases of tubal rupture presented to-night, and in the case of rupture of one of the ovarian veins it was clearly appreciated hours before death occurred. In any case the use of the aspirator, or even a limited exploratory incision, will settle the diagnosis of intra-peritoneal hemorrhage; this ascertained, the only hope of help then lies in an abdominal incision sufficiently free to admit of thorough exploration of the peritoneal cavity, of the arrest of the bleeding by ligature, actual cautery or even the extirpation of the sac, and of the complete removal of the blood already effused. I am not aware that this has yet been done in any case, but the results of abdominal incision for ovariotomy, hysterotomy and nephrotomy in recent years are such as to encourage the belief that by boldly opening the peritoneal cavity, and attacking directly the affected parts, rupture of the sac in extra-uterine pregnancy will not hereafter be invariably fatal. The case here is quite different from gunshot or other penetrating wounds of the abdomen, in which it has been considered bad surgery to probe or otherwise irritate the parts. In the latter a possibility of recovery may be present, but in the cases under consideration no such possibility exists; certain death is the result without interference, probable death even with interference. The only possible hope is in interference, so that it seems to me that all fundamental surgical rules impose the duty of abdominal incision upon the surgeon who has to do with an extra-uterine pregnancy after rupture has taken place.

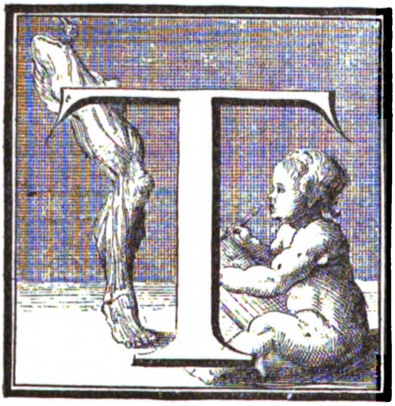
Historical and Bibliographical Notes:

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

II. AMBROSE PARÉ.

1509–1590.



THOUSANDS of human lives have been saved during the past three hundred and thirty years by the substitution of the ligature in place of the red-hot iron, which was previously employed to arrest hemorrhage from divided blood-vessels. The relief that came to the world by putting an end to the cruel torture occasioned by burning or scalding gun-shot wounds with boiling hot oil is incalculable. It was "the Father of French surgery" who wrought both of these great reforms, Ambrose Paré—the grand, the imperial surgeon of the sixteenth century; the earnest and devout old Huguenot, who ever ascribed all glory, power, and praise to our Heavenly Father, claiming that he dressed the wounds only, and that God cured them.

This "famous chirurgeon" was born at Bourg-Hersent, near Laval, in the province of Mayenne, France, in 1509 or 1510. He died at the age of eighty-one years at Paris, December 20, 1590. His parents were humble and poor, in consequence of which his early education was much neglected. He studied Latin, however, with a priest, and in return cultivated the garden of his reverend master, and groomed his mule.

Paré was early apprenticed to a barber-surgeon, by the name of Vialot, who taught him the rudiments of minor surgery. Colot, the celebrated lithotomist of that period, who came into the neighborhood of Laval to operate for stone, invited young Paré to hold his patient. The result of this opportunity to witness the surgeon's skill caused this youth to resolve to go to Paris to perfect himself in the science and art of chirurgery. The barber-surgeons then monopolized all the knowledge of this subject, and were the sole expounders of the art.

The works on the subject were few and faulty. Albucasis, Lanfranc, Brunus, Guido de Cauliac, and John de Vigo were the principal authorities. Paré pursued his studies three years in Paris, residing most of this time in the Hotel Dieu, that still famous hospital. When twenty-seven years of age (1636) he received the appointment of military surgeon, and from this date he served in this capacity for a third of a century. He became a member of the fraternity of Master-Surgeons, and subsequently was elected provost.

In 1552 he was appointed surgeon to Henry II, and thenceforth "the kings of France transmitted him to their successors as a legacy of the crown," holding the same position, in regular succession, to Francis II, Charles IX, and Henry III. These monarchs were all warmly attached to him; he was at once their privy-counsellor and their professional adviser; he followed them in their campaigns and attended them in their retirement. Their confidence in his skill was boundless. When Metz was invested (1552) by the great army of the Emperor Charles V, and sickness, and fearful mortality resulted from wounds, the beseiged became discouraged, a horror possessed their minds "that the medicaments wherewith they were dressed were poysoned; which caused Monsier de Guise and other Princes to send to the King for mee, and that hee would send mee with Drogues to them, for they beleeved theirs were poysoned, seeing that of their hurt people few escaped. I doe not beleeve there was any poyson, but the great stroakes of the Cutlasses, Musket shot, and the extremity of cold were the cause." (Johnson's translation, p. 1150; Lond., 1634.) He then proceeds to describe by what means he was clandestinely brought into the city, and how M. de Guise commanded that he "should be well used, and bid mee I should not faile to be the next day upon the Breach, where I should meete with all the Princes, and divers Captaines, which I did; who receaved me with great joy, who did mee the honour to imbrace me, and tell me I was very welcome, adding withall they did not feare to dye if they should chance to be hurt." (*Ibid.*) It is believed to be due to the inspiring effect of his presence at this critical juncture, that the beseiged held out until the Spaniards were obliged to raise the siege.

It is said that it was through his influence over Charles IX, that a stop was put to the progress of the massacre of St. Bartholomew's (August 24, 1572), when 70,000 Protestants or Huguenots were butchered in Paris and other parts of France by order of that weak and deluded prince. The old story that Paré was hidden in a closet to protect him from the fate of the other Huguenots is without foundation. He depended for safety on the promise of the king never to interfere with his religion.

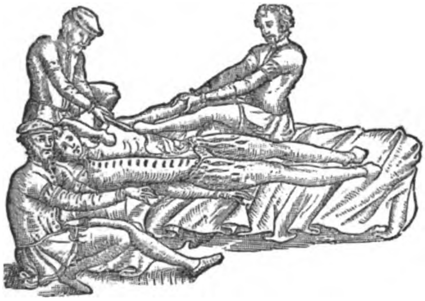
Among the improvements to operative surgery, for which we are indebted to this illustrious surgeon, the application of the ligature to cut or wounded blood-vessels is the greatest. For ages previous the actual cautery had been the principal means of staunching traumatic hemorrhage. The idea of tying arteries and veins was not absolutely new to the world, yet the practice of it was entirely so. Galen, Celsus, Avicenna and Albucasis had all alluded to it, but evidence is wanting to prove that any of them had practiced it. Certain it is it was not in use at that day, and its employment by Paré brought upon him violent and unmerited abuse. Thus Gourmelen called him a blood-thirsty, cruel rascal. In book 12, chapter 24, Paré explains the circumstances which led him "to devise this new form of remedy," wherein he "confesses" that he formerly used the actual cautery, "which thing cannot be spoken, or but thought upon without great horror, much less acted;" and for having followed "this old and too, too cruel way of healing," he thus laments, "Whereof I am ashamed and aggrieved." He believed that his new method came to him by inspiration. "I think it was taught me by the special favor of the sacred Deitie; for I learnt it not of my masters, nor of any other, neither have I at any time found it used by any. Only I have read it in Galen, that there was no speedier remedy for staunching of blood than to bind the vessels through which it flowed towards their roots, to wit, the liver and the heart."

Paré introduced podalic version in difficult labors; was first to employ the twisted suture in operations for the cure of hare-lip; first to extract loose cartilages from the knee joint; and first to reduce dislocations of the shoulder by the heel in the axilla. [The tail piece of this article is a photo-engraved reproduction of this procedure, from the first Latin edition of his works, Paris, 1582.] His works abound in ingenious devices, some of which have been claimed to be of recent invention. For example, a saw in every respect like Hey's; a club-foot boot, such as that devised by Syme; fine models of artificial legs, hands, noses and ears; also figures of drainage tubes, etc. Paré was a voluminous writer. His collected works make a ponderous folio of over a thousand pages. The first edition was published at Paris in 1575, having been amply illustrated with three hundred engravings, which cost him three thousand livres. It was dedicated "to Henry the third, the most Christian king of France and Poland." The following is an extract from the preface, as translated by Johnson, London, 1634:

> "For God is my witness, and all good men know, that I have laboured fifty yeares with all care and paines in the illustration and amplification of chirurgery; and that I have so certainly touched the marke whereat I aimed, that Antiquity may seeme to have nothing wherein it may exceed us, beside the glory of invention; nor posterity any thing left but a certaine small hope to adde some things, as it is easie to adde to former inventions. In performance whereof, I have been so prodigal of myself, my watchings, faculties and meanes, that I spared neither labor nor cost, whereby I might satisfie and accomplish my own desires, this my great work, and the desires of the studious. Neither may we doubt but their studies would at the length waxe cold, if they only furnished with the Theorick and Precepts in Schools and that with much laboure, should see no manuall operation, nor manifest way of performing the Arte, For which cause I seeking the praise and profit of the French Nation, even with the hinderance of my particular estate, have endeavored to illustrate and increase Chirurgerie hitherto obscure either by the infelicity of the former ages, or the envy of the Professors; and not only with precepts and rules, but being a lover of carved workes, I beautified it with 300 formes, or graven figures and apt delineations, in which whosoever shall attentively looke shall find five hundred anatomicall or organicall figures belonging to the Arte, (if they be reckoned particularly). To every of these I have given their names and shewed their use, least they should seeme to have beene put in vainly for ostentation or delight."

This work has passed through numerous editions, and has been printed in French, German, Dutch and English. The following is as complete a list of the several editions as I have been able to compile, French, *Paris*, fol. 1575, 1579, 1585, 1598, 1607, 1614, 1628, octavo, 1840–1. Latin, *Paris*, fol. 1582, *Frankfort*, fol. 1594, 1610, 1612. German, *Frankfort*, fol. 1601, 1635. Dutch, *Leyden*, fol. 1604. *Amsterdam*, fol. 1615, 1636, 1649. *Harlem*, fol. 1627. English, *London*, fol, 1634, 1678.

It is difficult to write a short sketch of Paré, so much can be found in his writings worthy to be mentioned. His stature was tall, his figure slender, his countenance grave and dignified. All his portraits represent him in his court dress, with the frilled collar characteristic of the age. The portrait which adorns this number of the ANNALS is a reduced *fac-simile* of the one in the first and most magnificent Latin edition of his works, published at Paris, in grand folio, during the lifetime of Paré.



Secundi modi restituendi humeri delineatio.

OPERA AMBROSII PAREI, PARISIIS, MDLXXXII, P. 445.

EDITORIAL DEPARTMENT.

MEDICAL SOCIETIES.

When the preposterous pagan finds himself overwhelmed with failure and chagrin, he steps to the side-board, takes down an idol, flogs it roundly, puts it back, and goes to supper. In much the same spirit the modern doctor, vexed with the disparity between his actual and his ideal development, looks for solace in cynical criticism of some medical society, which ought to have done for him what he has failed to do for himself. It might be of use to both the pagan and the doctor to know that, when a fetich is set up, it must be expected at times to disappoint its worshippers, and, furthermore, that chastisement will not always correct its conduct.

As a rule, our medical societies are unsatisfactory to those who should derive the most profit from their work. They promise much, but accomplish little. The mountain's dystocia is grievous, and, after all, the mouse is barely viable. The reason of this deplorable state of things appears to lie in a radical misconception of the nature, functions, and limitations of scientific fellowship. The necessity for such fellowship is recognized by all; but the conditions under which alone it can exist, are not so clearly understood.

First of all, science and trade are incompatible. Each may render the other great service; yet every attempt to blend the two interests in a single organization must end in failure. Science is pure and prosperous only when it is free; and trade loses its self-respect when it submits to any other restrictions than those imposed by the laws of trade. Hence the difficulty in eliciting valuable contributions to scientific medicine from district associations of medical men, whether they be city, county, state, or national organizations. These partake in some measure of the character of trade-unions, and such they must remain, so long as physicians are obliged to toil for a livelihood. As business associations they may prove themselves of the greatest value to the profession, guarding its interests, conserving its dignity, and promoting its advancement. But they can with difficulty be utilized for purposes of scientific investigation, and profitable scientific discussion must be rare beneath their ægis. These societies, when they enter upon the discharge of their legitimate functions will be efficient agents in the dissemination of established scientific results.

They will be excellent purveyors, rather than producers of knowledge. They will no longer furnish audience chambers for medical sophomores; but, instead, will command the deliberate utterances of their wisest members on topics of fundamental interest to all, and they will not permit these utterances to be smothered in a subsequent Sahara of miscellaneous debate.

Again, scientific fellowship cannot be obtained by artificial arrangements. It is here that elective affinities hold a legitimate sway. The men who should work together will gravitate to each other, and they will require little in the way of constitution and by-laws for the adjustment of their relations one to the other. It will be urged as an objection to the above proposition, that, if generally accepted, it would tend to the establishment of small coteries or cliques, which might be prejudicial to the parent society. But, as we have already shown, the proper work of a district medical society is quite different from that of a scientific coterie. Each, in its place, would strengthen the other. The greater the number of small societies doing productive work, the greater will be the number of well-trained intellects which the mother society can impress into her service as occasion may require.

It is only in the presence of congenial peers that the veritable student can bring forth his best work in his best manner. In a miscellaneous assemblage, the friction of personal antagonism, and the distress of appearing before unappreciative listeners, will inevitably fritter away the better part of his energies, and render him an easy prey to the desultory discussion that follows. The modern doctor, therefore, as he grows wiser, will forsake the ways of the preposterous pagan, and betake himself to actual study, content though his co-workers be few in number and obscure as himself.

THE CLINIC.

TRACHEOTOMY—DIPHTHERITIC CROUP.—Death. KING. Female, aged eleven years; croup sixty hours. Dyspnœa progressive and intense; diphtheritic deposit on tonsils; general condition good. Tracheotomy 2 A.M, November 26, 1879, by Dr. J. S. King, assisted by Doctors W. B. Chase and H. C. Rogers. Chloroform used. Operation uncomplicated and followed by immediate relief. After-treatment, stimulating. Did well for thirty-two hours; sudden attack of alarming asphyxia then occurred; tube removed by Dr. Chase, large amount of muco-pus with tubular cast of false membrane four inches in length was expelled through the wound followed by relief. Five hours after a similar attack of dyspnœa occurred, and a second tubular cast of equal length was expelled; after a respite of about ten minutes, intense dyspnœa again developed, ending rapidly in death by asphyxia. No autopsy. Membranous casts deposited in the Museum of the Anatomical and Surgical Society.

TRACHEOTOMY—DIPHTHERITIC CROUP.—Recovery. PILCHER. John Savage, aged six years; pharyngeal diphtheria developed October 13, 1879; slight croupous symptoms October 15; developed into pronounced dyspnœa evening of October 16; dyspnœa continuous and intense by the next morning. Patient of Dr. S. B. Childs. Treatment, inhalations of steam from slaking lime. Tracheotomy 1 P.M., October 17, 1879, by Dr. L. S. Pilcher, assisted by Drs. S. B. Childs, T. P. Corbally, and Mr. J. E. Pilcher. Condition of patient at time of operation, great and continuous dyspnœa; cyanosis well marked; face bedewed with clammy sweat; muscular strength still good. Ether given; trachea opened below isthmus; operation uncomplicated; immediate relief; convalescence rapid; tube removed on the fifth day; complete recovery.

OVARIOTOMY—DERMOID CYST.—Recovery. C. OLCOTT. Miss S., aged nineteen years; tumor in left iliac fossa, two years gradual and slow growth, six months rapid growth; general health failing. Abdominal section November 1, 1879, by Dr. C. Olcott, assisted by Drs. Pinkham, Metcalf, and others; omentum covered sac and was firmly adherent at several points; intestines also adherent at points; troublesome hæmorrhage excited by breaking up adhesions, controlled by actual cautery; contents of sac, thick and cheesy, requiring free incision for their evacuation; efforts to turn sac out from the abdominal cavity unsuccessful because of impaction in the superior pelvic strait of what proved to be a bony plate enclosed within the sac, by insinuating a finger beneath its edge this plate was tilted up and withdrawn; pedicle short and broad, tied in two parts and returned; reaction prompt and satisfactory; convalescence rapid and uninterrupted, temperature never reached 38.4° C.; sutures removed on seventh day leaving perfect union. Patient never realized the serious nature of the operation and was without apprehension throughout.

VOL. II, No. 3. MARCH, 1880.

ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

THE ANATOMY AND SURGERY OF THE EUSTACHIAN TUBE.*

BY ARTHUR MATHEWSON, M.D.

SURGEON TO THE BROOKLYN EYE AND EAR HOSPITAL; LECTURER ON DISEASES OF THE EAR IN THE LONG ISLAND HOSPITAL COLLEGE.

THE passage from the naso-pharyngeal space to the cavity of the tympanum, called the Eustachian tube after Eustachius, the celebrated Italian anatomist of the sixteenth century, who was one of the first to describe it, is one of the most important appendages of the organ of hearing, whether considered with reference to its functions, to the consequences of interference with those functions, as a gateway for the entrance of disease to the middle ear, or as the principal and most direct way of access for the application of remedies in the larger proportion of ear diseases.

Considered by embryologists an extension of the naso-pharynx, and lined by a continuation of the same mucous membrane, it is easy to see how troubles beginning in the former more exposed part should creep upward to it and through it to the cavity of the ear. Diseases of the tympanic cavity form three-quarters of all the affections of the ear, and except in perforation of the membrana tympani, the Eustachian tube is the only direct way of reaching it. Through this passage too we are often assisted to a diagnosis where other means fail.

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* Delivered before the Society, November 10th, 1879; revised from the stenographic report of Mr. J. E. Norcross.

The length of the tube is about 35 mm.—the upper third, a canal through the temporal bone, having osseous walls, while the lower two-thirds is partly surrounded by a hook-shaped cartilage, the remaining gap downward and outward being filled by a fibrous membrane. It begins above at the upper part of the anterior wall of the tympanic cavity (not at the lower part, as formerly stated by Gray), by an orifice known as the Ostium tympanicum tubæ, the upper boundary of which passes, with very slight curvature, into the roof of the tympanum, while below it meets the wall of that cavity with a much sharper curve, almost at right angles. This orifice has a height of 5 mm., and a breadth of 3mm. From these dimensions it narrows to a calibre of about 2 mm., being rather of a triangular shape than round or oval, and passes on downward, for-

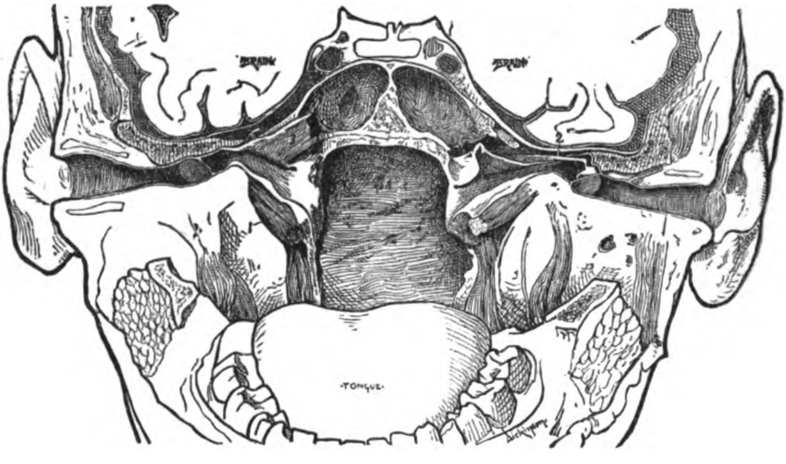

FIG. I.—VERTICAL SECTION OF HEAD DOWN TO MOUTH, SHOWING WHOLE EXTENT OF EUSTACHIAN TUBE.

1. Levator palati ; 2. Tensor tympani ; 3. Dilator tubae.—*Rüdinger.*

ward and inward at an angle of 135° with the transverse axis of the external meatus, and of 40° with the horizon. The osseous division terminates below in a jagged margin, the median wall projecting farther downward than the upper and lateral. The median wall separates it from the carotid canal, and a thin septum of bone from the canal of the tensor tympani muscle above. The narrowest portion of the whole canal, or isthmus tubæ, is a little below the union of the osseous and cartilaginous divisions, and is from 1½ to 2 mm. in height, and from ½ to ¾ mm. in breadth. From this point the passage gradually expands to its termination, just behind and on a level with the posterior angle of the inferior turbinated bone in the ostium pharyngeum, a flattened trumpet-shaped opening, somewhat pointed below, having a vertical diameter of 9 mm. and a transverse of 5 mm. The projecting lips of this orifice form an oval prominence in the naso-pharyngeal space, thick and dense behind and above, but less marked anteriorly.

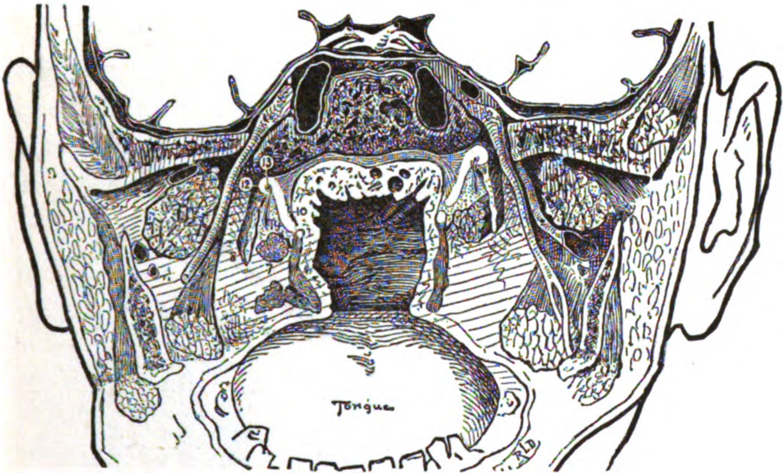

FIG. 2.—VERTICAL SECTION OF HEAD DOWN TO MOUTH, SHOWING TRANSVERSE SECTION OF EUSTACHIAN TUBE WITH ITS ATTACHED MUSCLES RELAXED.—7. Levator palati; 8. Dilator tubae; 10. Median cartilage; 12. Lateral part of cartilage; 13. Safety tube; 14 Lumen of tube, mucous surfaces in contact.—*Rüdinger.*

The course of the tube, as a whole, in its relations to surrounding parts, is well shown in Fig. 1, copied from a photograph of one of Rüdinger's remarkable sections. In this a part of the walls of the tubes is removed, and the soft parts drawn aside, so as to display its fully dilated calibre.

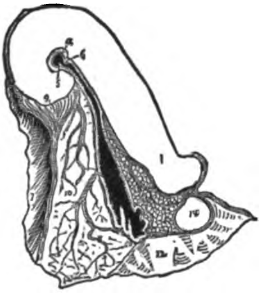

FIG. 3.—TRANSVERSE SECTION OF RIGHT EUSTACHIAN TUBE AT ITS LOWER THIRD; SEEN FROM BEFORE.

1. Median cartilage. 4. Safety tube. 5, 6. Mucous folds. 7. Dilator tubæ. 9. Attachment of dilator to blunt end of cartilage. 10. Connective and adipose tissue forming membranous portion of tube wall. 12. Levator palati. —*Rüdinger.*

Figure 2, also after Rüdinger, shows transverse sections across the middle of the tubes. Figures 3 and 4 also show transverse sections of the tube at other points in its course.

These last three figures show the passage when its attached muscles are relaxed, so that the elasticity of the cartilage keeps the walls almost in contact, and the word slit or fissure would convey a better idea of it than tube. Figures 3 and 4 at 4 and 18 show a circular space below, nearly, surrounded by the lateral hook-shaped part of the cartilage and give Rüdinger's idea as to the existence of an always open portion of the tube, which he calls a safety tube. At its lower edges, 5 and 6 are projecting mucous folds nearly in contact and almost completing a circle. Politzer does not believe there is such a circular division of the

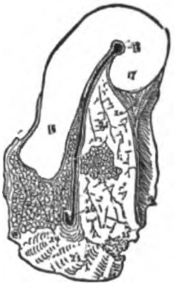

FIG. 4.—TRANSVERSE SECTION OF LEFT EUSTACHIAN TUBE AT ITS UPPER THIRD; SEEN FROM BEFORE.

16. Median plate of cartilage. 17. Lateral hook-shaped portion of cartilage. 18. Calibre of safety tube with less marked mucous folds. 19. Dilator tubæ. 20. Its attachment to lateral portion of cartilage. 21. Fat-containing connective tissue in which is shown a group of mucous glands at 22. 23. Levator palati. 24. Layer of mucous glands. 26. Fold of mucous membrane at lower portion of tube.—*Rüdinger.*

tube, and his idea as to the actual condition is shown by Fig. 5.

This question whether the walls of the tube are normally in contact in the cartilaginous portion, and only separate in the act of deglutition, has been much discussed, and authorities differ. Doubtless there is some variation in different individuals.

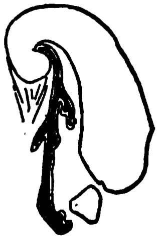

FIG. 5.—TRANSVERSE SECTION OF EUSTACHIAN TUBE.—*Politzer.*

The Eustachian tube in children differs from its adult condition in being shorter and wider, with a less projecting pharyngeal orifice, and a tympanic orifice relatively larger and more vertical, differences which as Politzer has remarked, account for the greater ease with which morbid secretions obstructing the passage are removed by the air douche.

The cartilage of the Eustachian tube is formed of a larger triangular portion, (16, Fig. 4), termed from its position the median plate, into a notch in the upper and outer part of which is inserted the smaller hook-shaped lateral plate (17, Fig. 4.) The point of union is not shown in the figures. The cartilage partly hyaline and partly fibro-cartilage, is here and there notched by projections of perichondrium. Its thickness increases from 1 mm. behind, to 6 or 7 at its free anterior edge.

The membranous part of the tube begins at the inrolled edge of the lateral cartilage, extending downward forms much of its outer and lower wall as shown at 10 and 21, Figs. 3 and 4, and passes into the fascia salpingo-pharyngea.

The mucous membrane lining the Eustachian tube is covered with cylindrical ciliated epithelium, the ciliæ having a movement such as to carry the secretions of the tube and the tympanic cavity onward toward the pharyngeal opening.

In the osseous portion it is thin, smooth, regular, with but few glands, and, as in the middle ear, so closely connected with the periosteum as to be inseparable, while in the cartilaginous portion it grows thicker and less regular, forming folds and rugæ projecting into its calibre, is richly supplied with acinose glands as shown in Figures 3, 4 and 5, and is connected with the perichondrium by loose tissue.

These folds partly disappear as the walls of the tube are drawn apart by the action of the attached muscles. Remembering the existence of these glands and of these folds it is not difficult to understand how easily the passage may become obstructed by even slight increase of secretions, by swelling of the lining membrane and by glandular hypertrophy.

The muscles attached to the Eustachian tube were formerly considered chiefly in relation to the soft palate, their action on the tube being scarcely recognized. The latter is now known to be of great importance.

The principal one of these muscles is that called from its attachments to the sphenoid bone, to the cartilage of the tube and to the soft palate, spheno-(salpingo)-staphylinus, and from its action on the palate and the tube, tensor palati and dilatator or abductor tubæ. It is a broad and flat muscle, so fixed to the inrolled edge of the cartilage, that when it contracts it tends to unroll it, and thus enlarge the calibre of the tube. This muscle is shown at 3, Fig. 1, cut across and turned upward and inward. In Fig. 2, it is shown at 8 in its usual position. Figures 3 and 4 show its attachment to the cartilage still more clearly, and how when fixed below it must act as a dilator of the tube. This muscle is believed to be directly connected with the tensor tympani and coördinate in action.

The petro-(salpingo)-staphylinus muscle, so-called from its attachments, and from its action on the soft palate, levator palati, forms a rounded bundle above, near its attachment to the petrous portion of the temporal bone at the anterior edge of the entrance of the carotid canal, and to the lower edge of the posterior upper end of the cartilage of the Eustachian tube, to which it is connected by only a few fibres. As it runs downward it becomes broader and flatter, and according to Henle dividing into two parts, is inserted by a wide tendinous expansion partly into the hard palate at its fibrous seam, and in part spreading out over the soft palate immediately under its mucous membrane, and interlacing with its fellow of the opposite side. Transverse sections of this muscle at different points in its course are shown at 1 and 7, Figs 1 and 2, and at 12 and 23, Figs 3 and 4. As this muscle contracts, it thickens up and thus elevates the membranous floor of the tube, shortening its vertical diameter and tending to increase the lateral, and so assisting the dilatator to change a narrow or closed slit into an oval canal.

A third muscle, the palato-pharyngeus, attached below to the soft palate and the edge of the hard, and above to the median cartilaginous plate, is supposed to act in fixing the latter. It is not shown in the plates.

To the action of these muscles thus tending with every movement of deglutition to separate the walls of the tube, the elasticity of the cartilage is antagonistic, and when they relax brings the mucous surfaces together again. A study of the figures will show how this takes place.

The methods of examining the Eustachian tube or its pharyngeal orifice in the living subject are by the rhinoscope, by tubes introduced through the nose, and more easily in cases where gaps congenital or pathological in nasal walls or palate favor, by direct inspection, and by the tactile and auscultatory means afforded by catheters, bougies, and the otoscope.

Professor Zaufal, of Prague, has been the most vigorous advocate of what he terms anterior rhinoscopy, and has demonstrated the practicability in most cases of inspecting the pharyngeal end of the tube by means of specula of metal or hard rubber like elongated ear specula of Politzer's model, introduced through the anterior nares, and illuminated by the concave mirror as in inspection of the external auditory meatus. They are twelve centimetres in length, and of calibres ranging from three to seven mm. Through them the oval-shaped orifice of the tube can be seen changing when the vowels are sounded to a more circular form under the action of the muscles which are thus brought into play. By a little shifting of the instrument much of the surrounding parts may be brought into view. From personal experience I can testify that as manipulated by my friend Dr. Prout the introduction of these specula is not much more uncomfortable than that of an ordinary Eustachian catheter. In an article published in the transactions of the American Otological Society, 1878, Dr. Prout, who had an opportunity of studying the application of this method under Zaufal, has described it in detail.

The functions of the Eustachian tube—very simple but not the less important—are to effect an interchange of air between the middle ear and the pharynx, thus keeping the sound conducting apparatus in a proper state of tension, to serve as an outlet for sound vibration from the middle ear, and to facilitate by ciliary action the removal of secretions from that cavity. It seems necessary for the perfect action of the membrana tympani and the auditory ossicles that there be an equilibrium between the air in the cavity and that pressing on the membrane through the external meatus. When the tube is in any way obstructed so that the access of air to the middle ear is prevented, the contained air is soon absorbed by being taken into the blood vessels, as in the lung, and the drum membrane insufficiently supported is forced inward by the pressure of the external air through the meatus, and is seen on inspection sunken and collapsed, and the hearing is impaired. This condition if not soon relieved may lead to permanent impairment of hearing, through the joints of the ossicles becoming fixed and stiffened in their false position; but if the equilibrium be early restored by opening the tube, and the drum membrane is pushed outward to its normal place, the hearing power is at once restored. When the air in the ear is rarified by swallowing with mouth and nostrils closed, the same sinking of the membrane takes place and the hearing affected, while by forcible expiration with closed mouth and nostrils the drum membrane is forced too much outward and the hearing diminished, especially for deeper tones.

The pathology of the Eustachian tube is so closely connected with that of the adjoining parts *i. e.* the naso-pharynx and the tympanic cavity, especially the former, that it is doubtful whether it is often affected independently. Its diseases are the same as those affecting the throat and nose, and may usually be considered as extensions of trouble begining in those more exposed parts. The most common are catarrhs—acute and chronic—with polypoid and adenoid vegetations, then ulcerations and purulent inflammation, as in syphilis and scarlatina, and less frequently inflammations accompanied by membranous exudations as in croup and diphtheria. In the majority of cases probably when the tube becomes affected the disease extends on up to the tympanic cavity, and in this way a large proportion of ear diseases begin, though it does not uniformly do so, and the diagnosis of tubal catarrh is in my opinion often a proper one. How often disease extends downward along the tube from the middle ear is difficult to determine.

The appearances of the pharyngeal orifice of the tube, when in a state of disease, on inspection by the rhinoscope, are those common in similar affections of mucous membrane in other parts, viz., increased redness, swelling such as sometimes to obliterate the mouth of the tube or to make its lips project much more than normally, and mucous secretions, which often form greenish crusts about the orifice. The granulations and adenoid and polypoid growths which so often affect other parts of the nasal and pharyngeal walls are also found in and about the mouth of the tube. How far these latter conditions extend upward along the course of the tube is difficult to determine during life, and post-mortem examinations have not been numerous enough to decide. As in gross appearance so in histological detail these affections correspond to those of the surrounding parts and need not here be dwelt upon.

A glance at the plates which exhibit the narrowness of the passage, the folds projecting into it and the abundance of glands will make manifest, how favorable the conditions are to obstruction by mucous swelling, glandular hypertrophy and morbid secretions.

With respect to subjective sensations there is nothing peculiar to or characteristic of disease of the Eustachian tube, excepting so far as its closure leads to impairment of hearing, to subjective noises, and an annoying sense of fullness and pressure in the ears often complained of.

Tactile examination by the catheter or bougies may help us to a conclusion as to the condition of the orifice of the tube, and small bougies passed through the catheter and into the tube as to the presence or absence of obstructions and stenosis further up.

As to the use of the catheter a great deal has been said for and against it, but few of those versed in modern otology would be found to deny it the chief place in the diagnosis and treatment of diseases of the Eustachian tube and middle ear. Many rules have been given for introducing it, amounting in fact, as Semeleder has said, to the following: "bring the catheter to the right spot, then make a correct and skillful turn or sliding movement with it!" The matter in truth stands very much as with catheterization of the urethra, and though the procedure is very simple, and there is nothing in it requiring any special dexterity, still practice gives facility, and no verbal directions will supply the want of it. The directions I am accustomed to give beginners are these; To hug the floor of the nasal passage with the beak of the catheter as it is pushed backward, thus avoiding the frequent error of getting it too far up and between the inferior and middle turbinated bones, and carry it on till it touches the posterior wall of the pharynx, the instrument having been in so doing changed from a vertical to a horizontal position. The proximal end of the catheter in the hand of the operator is then a little elevated, so as to tip the beak downward, and drawn forward till the beak drags against the posterior edge of the hard palate, when it is rotated outward till the ring on the proximal end marking the direction of the beak takes a position a little above the horizontal, looking toward the external angle of the eye, and then is pushed slightly backward. For the practiced hand it is not always necessary to follow these steps, but the instrument may be carried at once to place by feeling as it were. Measurements are of little assistance, so much do they vary in different individuals.

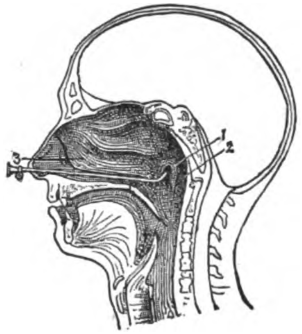

FIG. 6.—VERTICAL SECTION OF HEAD, SHOWING CATHETERIZATION OF EUSTACHIAN TUBE.

1. Posterior lip of pharyngeal orifice. 2. Rosenmüller's fossa. 3. Inferior turbinated bone.

To determine whether the catheter is in place I am accustomed to rely most on the auscultation sounds afforded by the tube connecting the ear of the patient with my own. When the tube is freely open, the air forced through it from the catheter enters the middle ear with a noise which to me seems unmistakable, though not easy to describe. When I do not obtain this evidence after repeatedly forcing the air through the catheter, I gently shift the position of its beak, and if I do not succed try one of different curvature, or introduce a bougie through it to remove possible obstructions. The act of swallowing, as the air is forced in, will often facilitate its entrance through the tube. Where the tube is very much narrowed or obstructed, it may be, in some cases, difficult to determine by auscultation whether the sound conveyed through the otoscope is that of air entering the ear or blowing against the walls of the pharynx, at or near the mouth of the tube, and in such cases, and in those in which it is absolutely closed, the only certain means of determining the position of the catheter is inspection by.the rhinoscope, though the injection of the vessels along the handle of the malleus and the sensations of the patient have some value as evidence. Most of the other signs given by different writers I regard as fallacious. I fully agree with Dr. Roosa in thinking that the cases are very few in which the air cannot be made to enter the ear through the catheter or by Politzer's method. The physical difficulties in the way of carrying the catheter to the mouth of the Eustachian tube are few, the most frequent being the bending of the septum nasi to one side so as to obstruct the passage. Spasmodic contraction of the muscles of the soft palate sometimes interfere with the rotation of the beak of the catheter into place, especially where one of strong curvature is used. With a little patience, relaxation soon takes place. Patients not infrequently have a dread of the operation where it has been explained to them beforehand, and it is usually the better way to proceed at once to its execution without previous explanation, when they are found to bear it more quietly than when their imaginations have had opportunity to excite their fears. As in all use of catheters and bougies, delicacy of manipulation should be observed, and all violence abstained from.

The sensation caused by the passage of the catheter, judging from my own experience, is one of discomfort rather than pain, and the lachrymation often observed is not caused by suffering. The first passage of the instrument is usually the most unpleasant. It is a good practical lesson to everyone who uses the Eustachian catheter to try it on himself.

Of the catheters in ordinary use, I prefer one of medium calibre and curvature as combining ease of introduction and concentration of the force of the air current. Those of sharp curvature are often more difficult to get into place, though perhaps when in place the air current enters the tube more directly and forcibly. I do not see the advantage of using the catheters of large calibre, for they are not so easy of introduction, and there is not so much concentration of the force of the air current. Those of quite small calibre may be of service where the nasal passages are narrow or the patient nervous, but the current of air through them is not so strong, in accordance with well known laws of pneumatics. Those of hard rubber cause less disagreeable sensations than the metallic; are not corroded by the injections passed through them; by their elasticity more readily slide around obstructions, and from their lightness are less likely to fall out of place. The instrument is most easily held in place by the thumb (below) and forefinger (above) of the surgeon's left hand—the hand being steadied by the other fingers resting on the nose of the patient. The forehead attachments figured in some of the text-books, are for the most part useless encumbrances.

An elastic air-bag, with a nozzle fitting closely into the proximal end of the catheter, and compressed by the surgeon's hand, is the best way of forcing air through the catheter into the tube. All the force desirable in most cases can be attained by this simple means, and the elaborate air pumps described by some authors are seldom used.

The dangers as well as the difficulties of catheterising the Eustachian tube have been greatly exaggerated. With proper care there is no danger whatever. The only accident at all likely to occur is the production of emphysema by air forced through tissues wounded by the point of the catheter. The only time I ever saw this occur was in case of an old woman in Politzer's clinic in Vienna. Holding the instrument too stiffly while the patient was coughing, its point was forced through the tissues swollen and softened from catarrh, and using the air bag immediately after without varying its position I had the mortification to find I had produced an emphysema. It occasioned an uncomfortable sense of fullness about the throat, with some interference with deglutition and phonation, and the walls of the pharynx were seen to be puffy and swollen. This condition soon passed away without treatment and without any bad consequences. This case taught me caution in the handling of the catheter and the use of the air bag when coughing or sneezing has been (as it often is) excited by the introduction.

The propriety of keeping the instrument scrupulously clean in all cases, and the use of separate ones in suspected cases to avoid the danger of infection need only be mentioned to be appreciated.

But brief notice of other methods of catherization is needed, for except in abnormal conditions of the nasal passages that through them is the most certain of execution and most practically useful. When as sometimes happens the passage on one side is so narrowed by the bending of the septum nasi or some other abnormality as to be impermeable, the tube may be reached by the catheter passed through the other side, one of more strongly curved beak being preferred for this purpose. Dr. Noyes of New York, has devised one of double curve for such use. The faucial catheters of Drs. Pomeroy and Cutter may be of service where the usual method fails.

Next to the use of the catheter the chief method of driving air through the Eustachian tube is that devised by Politzer. It consists simply in forcing air from an elastic bag into the nostrils, which are tightly closed over its nozzle by the fingers, at the moment when the patient at a signal given swallows water previously taken into the mouth. The muscles attached to the Eustachian tube and soft palate, as has been before explained, in the act of swallowing not only lift the soft palate so that valve-like, it prevents the air from going downward into the throat, but tends to separate the walls of the tube into which the compressed air then rushes and forces its way onward to the ear if the obstructions be not too firm. The value of this method in cases where use of catheter is rendered impracticable by physical obstruction or from nervous fears, as in children, is beyond all estimate in treatment of the tube and the ear. Modifications of it useful in some cases are those of Dr. Holt of Portland, who instead of having the patient swallow, directs him to fill his mouth tensely with air, of Dr. Tansley of New York, who directs to blow forcibly from the mouth with puckered lips, and of Gruber who makes the patient sound the syllables *hich*, *hock*, etc., as the air is forced into the nostrils by the bag. Some patients complain of a disagreeable sensation along the œsophagus in swallowing water when the air bag is used, and this difficulty is obviated by these latter modifications, which are also often more practicable with young children. The air douche may also be applied by blowing through a simple tube introduced into the nostrils instead of using the bag. In case of children too young, or too much frightened to assist by swallowing or blowing, we may often succeed by covering the mouth closely with the hand and rapidly and repeatedly forcing the air into the nostril by a valved air-bag, or by blowing through a simple tube. The sensations of the patient, the appearance of the membrana tympani (injection), and the auscultation sounds with the otoscope must determine whether the attempt has succeeded. Dr. Agnew has found that in cases where he did not at first succeed on account of inflammatory swelling, he has done so after syringing the posterior nares with a warm solution of common salt, supercarbonate of soda, or sulphate of magnesia, (drachm to a pint of water), and allowing an interval of fifteen minutes to elapse before repeating the attempt. Even where the catheter is used, Politzer's method comes in as a valuable adjunct, and I generally employ it in addition to catheterization.

Besides air the vapors of iodine, ammonia, ether or chloroform may be injected by Politzer's method, either being drawn up into the ballon itself from a bottle, or the fluids dropped into a receptacle near the nozzle.

The dangers from the procedure are almost nil, for although the drum membrane has sometimes been ruptured by it, it has nearly always been in consequence of pathological changes and the result has been rather beneficial than otherwise. The force of the pressure however, should be regulated according to the nature of the case, and at first be slight in order not to cause alarm or discomfort.

Valsalva's method, viz., shutting the mouth, closing the nose with the fingers and making forcible expiration has been much in vogue, but though it often opens the passage to the ear, it is in many cases wholly inefficient, is apt to produce injurious congestion, and is likely to be abused by patients who resort to it too frequently and diminish the hearing by impairing the natural tension of the drum membrane. For this same reason all methods of inflating the middle ear should be used not too frequently or for too long periods without intermission.

To complete what I have to say about the pathology of the tube, I would add that various abnormities have been described by Toynbee, Gruber, and others, such as bands of adhesion, complete obliteration of calibre, and irregularities of direction, but these are so rare and so difficult of positive diagnosis during life, that they are rather to be regarded as pathological curiosities. In 1523 dissections by Toynbee, the only abnormities found were three cases of bands of adhesion connecting the walls of the tube, two of stricture in the cartilaginous portion, one of stricture in the osseous portion.

Considering the frequency of ulcerations from syphilis, scarlatina and diphtheria affecting the adjoining parts, in connection with the fact of the mucous surfaces of the tube lying in contact to so great an extent, it is surprising that adhesions and obliterations of the calibre of the tube are not more frequent.

The surgery and therapeutics of the Eustachian tube, like its anatomy and pathology, are so closely connected with those of the naso-pharyngeal space and middle ear as hardly to be separable. As has been seen from the foregoing, the chief affections of the tube are the different forms of catarrh and their consequences, viz., obstruction and contraction of calibre by swelling, morbid secretions, granulations and vegetations. The catarrh here, as elsewhere, when it can be safely reached, is to be attacked by stimulating and astringent applications, the growths removed by caustics and operative means, general hygienic measures to tone up the system and enable it to resist the tendency to this form of degeneration not being forgotten, while temporary obstructions and closures are to be removed by use of the catheter and Politzer's method.

In the acute forms of catarrh, only mild remedies are needed, such as the inhalation of steam, either simple or impregnated with the vapors of acetic acid, carbolic acid or ammonia, while a gentle application of the air douche by Politzer's method will serve to open the tube, and remove obstructions, thus preventing the evil consequences which may result from its continued closure. The unnecessary introduction of the catheter is to be avoided, for fear of irritating the inflamed membranes.

In the chronic and subacute cases, stronger applications are indicated, and, in my opinion, through the catheter is the best way of making them. I rely mostly on solutions of nitrate of silver, varying in strength from five to twenty grains to the ounce of water, introduced into the proximal end of the catheter by a small syringe or medicine dropper, and blown up into the tube by the air-bag, not used with sufficient force to carry it into the tympanic cavity, where it would be likely to set up an undesirable degree of irritation.

I seldom resort to other solutions than these, except the sulphate of zinc (from five to ten grains to the ounce of water). The faucial catheter of Pomeroy, or an ordinary rubber catheter with its beak bent to a sharper curve and its orifice compressed while softened by heat, is also a useful means of applying these solutions, via the posterior nares. Powdered alum blown through a tube is serviceable in many cases.

Simple bougies of whalebone, catgut or elastic, for dilating the tube have long been in use, and I have sometimes resorted to them, though I have seldom met with cases in which the tube was not permeable by air or vapors injected by some of the methods described, or in which I thought the advantages offered by their use in the treatment of excessive swelling of the mucous membrane compensated for the danger of emphysema and suppurative inflammation of the middle ear sometimes occasioned.

So far as I know, no one has attempted to extend the treatment of strictures by incision, now so much in vogue, to stenoses of the Eustachian tube.

The adenoid vegetations found in the neighboring parts of the naso-pharynx and at the mouth of the tube are removed by nitrate of silver in substance, by nitric acid and the galvano-cautery applied through the catheter, and Zaufal's specula, or by the way of the posterior nares. Forceps introduced through posterior nares, and ring-shaped knives on slender flexible stems, have also been used for their removal, and Zaufal has recommended an elongated snare, a modification of Blake's polypus snare, for use through his specula. The atomizer is also a useful method of making applications to the mouth of the tube by way either of the anterior or posterior nares.

There are many cases in which enlarged tonsils are found with closed tubes, and some have supposed this enlargement to act as a cause, closing the tubes by direct pressure upward, but as Toynbee has stated, the tonsils in their most extreme degree of hypertrophy never reach to the tube. Consequently excision of them for the cure of deafness is of no effect, except perhaps by relieving the congestion at the mouth of the tube, which is the real cause of obstruction, and by allowing the muscles of the tube to act more freely.

Society Reports.

STATED MEETING, NOVEMBER 17TH, 1879.

The President, Dr. L. S. PILCHER, in the Chair.

AN IMPROVED METHOD OF PERINEORRHAPHY.

E. S. BUNKER, M.D.

Laceration of the perineum, not involving the sphincter ani, is by no means a rare accident, and perineorrhaphy is much more frequently indicated than was formerly supposed. The operation has been greatly simplified in recent times, so that it belongs, not so much to the brilliant repertoire of the specialist, as to the every day work of the general practitioner. The essential phases of the operation are three: 1, the denuding of the parts; 2, the adjustment of the sutures; 3, the removal of the sutures after union has taken place.

1. *Denuding the parts.*—The method which I employ is based upon a suggestion from my friend, Dr. John Merritt, of this city. With a scalpel I make a V-shaped incision through the integument. This marks the outer limits of the space that is to be denuded (see the dark line *a b c*, Fig. 1). Then, seizing the apex with a forceps or tenaculum, I dissect up the skin from the part to be denuded in a single triangular flap, which I leave attached by its base to the posterior wall of the vagina (Fig. 2). This can be done with great rapidity, and there is absolutely no loss

of tissue to the patient. The flap is then lifted out of the way by an assistant, and the sutures are inserted and secured in the ordinary way. It will now be found that the flap has become very much retracted from before backward, and that, from side to side, it is folded upon itself like a sheet thrown over a clothes-line (Fig. 3). The apex now barely reaches to the ostium vaginæ, and the two lateral halves of the raw surface of the flap being brought into apposition quickly unite. The flap, treated in this way, roofs over the wounded parts beneath, and protects them from vaginal discharges. Ultimately it becomes a solid raphé, reinforcing the new-made perineal body.

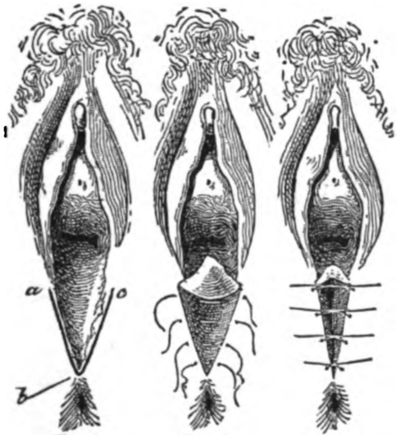

FIG. 1 FIG. 2 FIG. 3

PERINEORRHAPHY.

FIG. 1. Line of incision. FIG. 2. Sutures introduced. FIG. 3. Parts half drawn together. When the operation is completed only a vertical line of incision would be seen.

2. *The sutures.*—Several years ago I published a note advocating the use of horse-hair sutures in perineorrhaphy. A subsequent experience in several scores of cases has not changed my estimate of their value. They are easy of adjustment, secure, easy of removal, and they give the patient relatively little pain while they are *in situ*. I use a

needle curved in the segment of a circle, and introduce it by the aid of Sims' needle holder. Two horse hairs, doubled so as to make four strands, will always hold.

3. *Removal of the sutures.*—This I usually do about the seventh day. With horsehair it is as a rule painless; with silver wire it is often attended with atrocious suffering.

This method of operating admits of great celerity. Two years ago I applied it in a case where nitrous oxide gas was administered by my friend, Dr. G. W. Brush, and the total duration of anæsthesia was only seventeen minutes, during which time every step of the operation was carried out. I have twice operated on lacerations through the sphincter, using only horse-hair sutures: the result in each case was satisfactory.

CASE OF HARE LIP AND CLEFT PALATE REMEDIED BY OPERATION AND INSERTION OF ARTIFICIAL PALATE. RATIONALE OF IMPERFECT ARTICULATION IN SUCH CASES.

JAMES L. LITTLE, M.D., AND N. W. KINGSLEY, M.D.

Professor James L. Little, of New York, presented a patient, a young man, upon whom he had operated for relief of double hare lip of an unusually extreme character. Other members of the same family had also been the subjects of this deformity.

Photographs of these cases were shown, and also plaster casts representing the original condition of the patient. By a series of operations the lip deformity had been remedied, but there still remained a very wide gap extending through both hard and soft palates, in consequence of which his articulation was so imperfect that his efforts at speech were perfectly unintelligible.

Dr. Little said that after he had operated upon the lip, Dr. Kingsley had kindly consented to take charge of the boy, and see what could be done to remedy the defective palate and benefit his speech. He had invited Dr. K. to be present, and with the permission of the society the course that had been pursued would be described by him.

Dr. N. W. Kingsley, of New York, was then introduced, who spoke substantially as follows:

When this boy came under my care a few months ago, it was utterly impossible to understand a single sentence he said, and but very few words; he could not speak his own name, nor could he make by language his wants known to strangers. Every consonantal sound of the English language but three was imperfect, and in reading aloud not a single syllable was recognizable.

The reasons for this extraordinary inability are readily understood by any one who is familiar with the philosophy and mechanism of speech.

Let me call your attention to a few important points which are illustrated by the diagram.

The outlines will be recognized as the profile of a face from the nose to the throat inclusive, together with the outline of the principal internal organs along the median line. A, the larynx; B, the tongue, and CC, the hard and soft palate.

In the production of vocal speech the voice issues from the larynx, and is directed by the velum through the mouth or through the nasal passages, or, as indicated in the drawing, it may pass through both.

For the perfect production of vowels used in English, the palate should be in close contact with the pharyngeal wall at Fig. 1, and all the voice directed through the mouth. If the palate be relaxed, as shown in the drawing, the vowel sound will have a nasal resonance. Such vowels form a part of the French language but are never heard when English is spoken with purity.

The formation of the different vowels depends chiefly upon the resonance caused by the varying forms and dimensions which the buccal cavity can assume, but in all cases there must be an unobstructed passage for the vocal stream from the larynx to the lips.

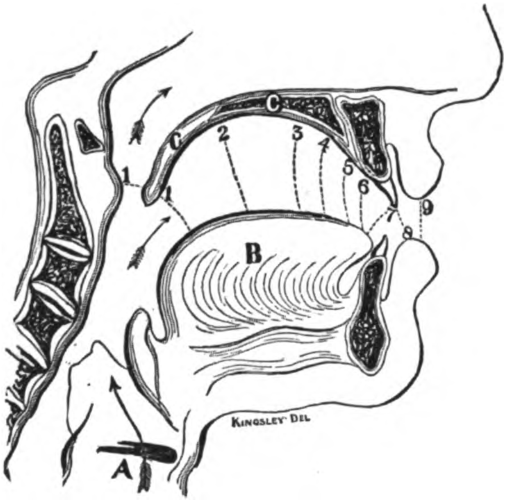

FIG.—SHOWING POINTS OF CONTACT FOR THE PRODUCTION OF ARTICULATE CONSONANTAL SOUNDS.

Obstructions or interruptions to this passage originate the consonants. Thus K and G are formed by a complete closure of the upper pharynx along the dotted line 1, 1. To do this, the back of the tongue is lifted against the palate, and the pharyngeal wall is advanced until complete contact is made.

This interruption to a breath current without voice forms K, but when the breath current has added to it the sound produced by the vocal chords, G is the result. The position of the organs is identical with both.

Most of the consonants are thus formed in pairs. One position of the organs permitting two sounds, one vocalized and the other unvocalized.

In whispering every vocalized sound is lost, and K and G become one, or rather G is lost and the attempt to make it in whisper produces only K.

The second point of interruption is at 2. The sound formed here does not occur in English—it is the German *ich*.

The next point is further forward, at 3 and the two sounds formed by the elevation of the tongue into contact at this point are Ch and J.

In like manner, and in the following order, are produced other pairs of consonantal sounds:

At 4, Sh and Zh; at 5, S and Z; at 6, T and D; at 7, the two sounds of Th, as in thin and thou, the tongue being in contact with the upper teeth; at 8, F and V; and, lastly, at 9, the sounds of P and B are formed by opening and closing the lips.

This description does not include all the sounds of the English language, but it is sufficient to illustrate the case before us.

We now see why it was impossible for this boy to articulate. There was no roof to his mouth from front to rear; the gap was the widest I ever saw, and before Dr. Little operated there was absolutely no point of interruption to the oral stream throughout its entire course.

Without an upper lip P and B could not be formed, and without teeth, roof or palate the other sounds were equally impossible,

I made for this patient a substitute for the lost organs by inserting artificial teeth, an artificial roof and an artificial velum. The velum is elastic and flexible, and resembles the natural organ in its mobility as nearly as is possible by art.

As before intimated, this was introduced last spring. I had no opportunity to train the patient in the use of it, as he left immediately thereafter for his home in New Jersey. I did not see him again until within the last ten days, and, to my regret, I found but little improvement in his speech. That this was the result of neglect on his part, or possibly want of instruction, I was convinced, and for a few days past he has come to me for a little practice. I think I shall be able to show you what progress he has made.

Dr. Kingsley then handed the patient a newspaper, and asked him to read a passage, his apparatus being at the time out of his mouth.

The patient read a few sentences, but so imperfect was his articulation that but few, if any, in the audience recognized a single word.

His artificial palate was then introduced; his name was asked, his residence, and various other questions, all of which he answered with the utmost distinctness.

The doctor then handed him a paper, and he read a passage. The articulation was clear and distinct, every word being perfectly understood, and the only peculiarity noticeable was a difference in the resonance of his voice from that which is usually heard.

STATED MEETING, DECEMBER 15TH, 1879.

The Vice President, Dr. FRANCIS H. STUART, in the Chair.

AN IMPROVED METHOD OF TREATING DEPRESSED FRACTURES OF THE NASAL BONES.

LEWIS D. MASON, M.D.

In the osseous structure or framework of the nose the principle of the arch is involved, the sides being formed by the nasal processes of the superior maxilla, the crown or centre by the nasal bones. This is well seen in some of the mammals, notably the monkey.

Experiments upon the cadaver have shown that any force sufficient to depress or break down the crown of the nasal arch necessarily involves fracture to a greater or less extent of the nasal processes of the superior maxilla, an exception being in young children in whom a depression may occur without fracture, by a spreading apart of the nasal processes, and thus a depression of the crown of the arch be produced. We also except those cases alluded to by Hamilton, in which the nasal bones are broken at their external lateral margins, and are crowded back or driven in between the nasal processes, constituting "a displacement or dislocation rather than a fracture." The result of experiments upon the cadaver have led me to conclude:

1. That in all fractures of nasal bones, with depression of bridge, the nasal processes of the superior maxillæ are necessarily involved.

2. That both nasal processes are usually fractured, and the line of fracture is nearly on the same plane on either side.

The indications for treatment are to reduce the fracture or restore the normal contour of the nose, and to retain the fragments in position until union shall have taken place. The majority of surgical authorities agree that reduction is easily effected, and recommend the ordinary grooved steel director as best adapted for this purpose, as it combines with delicacy sufficient strength. Passing the director into the meatus just beneath the depressed fragments, pressure is made forward and upward until we have attained a satisfactory elevation of the depressed bones, aiding our efforts within the nose by external manipulation.

In the class of fractures under consideration the great difficulty consists in our inability to retain the fragments in place, the sides as well as the centre of the arch being broken down. We have to deal with extensive comminution, and hence under the usual plans of treatment, although the arch may be temporarily restored, it cannot be kept in position. There are certain conditions that increase this tendency of the fragments to become displaced:

1. The swelling that takes place between the integument and bone.

2. The efforts of the patient to clear the throat and nostrils as in hawking, snuffing, etc.

To these add the facts that the usual dressings are inadequate, not capable of nice adjustment, and readily disarranged, and it becomes apparent why it is not easy to keep the fragments in position.

The usual methods of treatment may be classified as those applied from within the nose, and those without.

Belonging to the first class are pledgets of lint and canulæ. To the second class, moulds and compresses of lint with adhesive plaster. In Hamilton's treatise these various methods, with comments as to their utility, are given in a concise form, as follows:

" I am not certain that it will always be found so easy to retain these loose fragments in place as it is to replace them. The very swelling which takes place so promptly under the skin tends to depress the fragments, unsupported as they are by any counter-force, a tendency which possibly is in some instances increased by attempts on the part of the patient to clear his nostrils by snuffing and hawking." " None of the plans which I have seen suggested, possess, in my estimation, much practical value. Few patients will consent to the introduction of pledgets of lint or of stuffed bags, or indeed of anything else sufficiently far up into the nostrils to answer any useful purpose. The membrane is too sensitive, too intolerant of irritants to enable us to have recourse generally to such methods. Then too it would require on the part of the surgeon more than ordinary tact to accomplish so nice and delicate an adjustment of the supports from below as these cases demand, where the slightest excess of pressure, or the least fault in the position of the compress, must defeat the purpose of the operator." In lieu of a better method, the author recommends the use of pledgets of lint in fractures with extensive comminution.

The employment of canulae he regards as unnecessary and harmful, and recommends "nicely adjusted compresses made of soft cotton or lint, and secured on the nose with delicate strips of adhesive plaster," as the best form of external dressing.

The method I have to suggest is to pass an ordinary surgical needle of medium size, so that it shall afford not only a posterior support to the nasal bones, but shall act as a tie-rod, holding together the sides of the nasal arch.

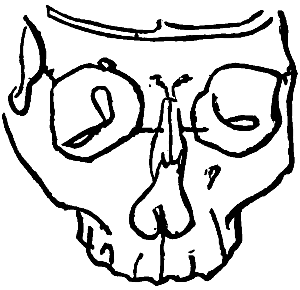

FIG. 1.—Showing needle passed beneath nasal bones.

The necessary appliance consists of a handle to carry the needle;

this is hollow, and has a screw-top, a convenient receptacle for needles when not in use. The needle is the ordinary three cornered surgical needle of medium size, somewhat flattened at the head, so as to be more readily held in the handle by a thumb-screw, and ground to a drill point; it is also nickle-plated or gilded to prevent corrosion. In an emergency any strong needle-carrier would do, and the needle could be easily prepared. After proper elevation of the depressed fragments, the needle is passed usually through the line of fracture of the nasal processes on either side (Fig. 1).

The line of fracture can be readily felt before inserting the needle, or can be searched for subcutaneously with the point of the needle. By thus supporting the fractured nasal processes, we sustain the nasal bones, which rest upon them. Should the line of fracture not prove symmetrical, we can drill through the nasal processes on either side, at such points as circumstances may dictate. Under any conditions the needle will have three points of support; the nasal processes on either side and the nasal septum (Fig. 2). To complete the dressing, a small strip or ribbon of pure rubber bandage is placed over the bridge of the nose by puncturing either end on the head and point of the needle (Fig. 3), giving the rubber sufficient tension to exert a gentle downward and lateral compression, but not enough to interfere with the circulation of the part, or to exert a degree of pressure on the fragments.

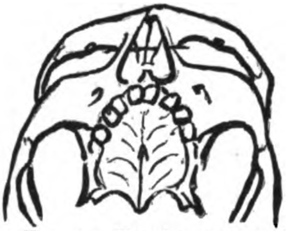

FIG. 2.—Showing course of needle as viewed from below, looking up into nasal cavities.

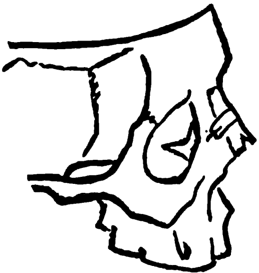

FIG. 3.—Showing rubber tape passed over bridge of nose, and fastened by needle thrust beneath nasal bones, exerting lateral support.

The point and head of the needle may be protected by small pieces of cork. At the end of the sixth day, or as soon as consolidation is sufficiently advanced to sustain the fragments, the needle may then be withdrawn as we do the pins in acupressure or hare-lip when they have served their purpose. Anæsthesia will be necessary during the manipulation for the restoration of the arch, the passing of the needle, and probably for its removal also.

The advantages that this method seems to possess are as follows:

It gives adequate posterior support to the fragments, and binds them together.

Does not admit of displacement by any ordinary movements or subsequent swelling.

Does not impede restoration. Admits of constant inspection of the fracture without removal of the dressing. Permits the application of evaporating lotions if desired. Inflicts the least possible injury to the soft and hard tissues, being simply a needle puncture. Is comparatively inexpensive and simple in its application.

SUCCESSFUL EXTIRPATION OF ERECTILE TUMOR OF THE PAROTID GLAND.

L. S. PILCHER, M.D.

Dr. Pilcher presented a tumor of the parotid gland, a shrunken spongy mass of cavernous tissue, and by mounted microscopic sections of the same, prepared by Dr. Charles Jewett, demonstrated to the Society both the normal glandular and the altered cavernous structure of the organ. The history of this case was as follows;

Female infant. At birth presented a superficial scarlet naevus partly in front and partly behind the left ear and extending down upon side of neck. When three weeks old the left parotid began to enlarge; after two weeks of slow growth, a very rapid increase in size began, so that in three weeks from the time the enlargement was first noticed, and when the child was six weeks old it had developed into a tumor which extended from the angle of the jaw to the zygoma and presented prominently in front of the ear; by compression it could be made to nearly disappear, rapidly filling again upon the removal of the compression; it did not pulsate. November 6, 1879, when the infant was six weeks old, the tumor was removed by Dr. Pilcher, assisted by Drs. C. Jewett and F. W. Rockwell. The operation was much facilitated by the use of the hemostatic forceps of Péan to control the bleeding from the venous trunks which fed the tumor, and from the terminal branches of the external carotid artery which passed through it. The entire mass of erectile tissue was removed with but little loss of blood; after its removal it was apparent that the only portions of the parotid gland remaining were the tongues which dip in behind the ramus of the lower jaw, and which pass backward beneath the sterno-cleido-mastiod. The branches of the facial nerve were necessarily cut, producing paralysis of the facial muscles on that side. Although the immediate shock of so formidable an operation in so young an infant was considerable, good reaction was secured and rapid convalescence followed.

Historical and Bibliographical Notes :

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M. D.

III. BARTOLOMMEO EUSTACHIO.

1520–1574.

THREE names stand preeminent in the history of anatomy as the restorers and reformers of that science, viz: Vesalius of Brussels, Eustachius of Rome, and Fallopius of Modena. These old masters were contemporaries, all were famous in their day, and each enriched this science by important discoveries. Before their labors began, anatomy had been so imperfectly studied that it was scarcely worthy of being called a science, and hence this trio should be regarded as its real founders. Bartholomew Eustachius was born at San-Severino, in the March of Ancona, near Salerno in Italy. The precise date of his birth is not known, it is probable that it was about the year 1520. Very little is known regarding his life, except that he studied anatomy at Rome, where he must have pursued this subject with the ardor of an enthusiast and certainly with eminent success, for he informs us, in the introduction of one of his works, (*Opusc. Anatom.*) that in 1562 he was professor of medicine in the Collegio della Sapienza, at Rome. Notwithstanding that he held this high position and that he was patronized by two Cardinals, Borromeo and Rovero, and that he was widely celebrated for his extensive acquirements in anatomy, yet he failed to obtain pecuniary success, of which he complains in the introduction above alluded to, and died as he had lived, in poverty, at Rome, in the year 1574.

It was, doubtless, the grand object of his ambition, probably in emulation of what Vesalius had so recently done, to furnish the world with a still more complete and magnificent work on the structure and functions of the human organism than had ever been seen before. To this end he had more carefully dissected the bodies of men and animals, the latter to elucidate the former, and his labors were crowned with greater success, and by more important discoveries than those of any other anatomist either in ancient or modern times. The better to illustrate his treatise, he had about forty beautiful folio plates engraved on copper, being the first of the kind ever made for this purpose, as all previous anatomical figures had been more or less rudely cut in wood. If we may judge by the minuteness and accuracy of these famous plates, and by the careful detail of his anatomical descriptions contained in the minor works which he published, we can comprehend the force of Lauth's remark, (in his *History of Anatomical Discovery*) that, if Eustachius had been able to publish, both text and plates of his great work, anatomy would have attained the perfection of the eighteenth century, two hundred years earlier, It is to be lamented, as it must have been by this poor student of nature, that his poverty prevented the publication of his valuable treatise, after the bestowal of so much painstaken labor upon its preparation, and so much of his scanty earnings in the production of his marvellous plates, yet such was the will of the Gods. Unfortunately the entire text of the work is totally lost. The plates were lost to the world for a hundred and fifty years! They were commenced as early as 1552, but were not entirely completed at the time of Eustachius' death. It is possible that they were stowed away in the papal library, for we are told that when the plates were found they were presented by Pope Clement XI to Lancisi, his physician, who published them in 1714. It is also stated that Pinus, a friend of Eustachius, preserved them during his lifetime, and that he transmitted them to the family of Rubens.

Space will not admit of any special description of these plates, but to furnish an idea of their comprehensiveness, to those who are not familar with them, seven entire plates of many figures, are devoted to the kidneys alone, and twice this number to the muscles of the human body. One of his most important works was "On the Controversies of Anatomists," which was announced by him as ready for the press, but was never published, passed into oblivion and is now not extant. It is possible that some of these works may yet come to light. Louis Frank, in a notice of Flajanus (*Annali universali di med.*, Milan, Juin, 1823) says, that among the Mss. stored away in the library of this physician they have found one by Eustachius, remaining unpublished, having for its title *De Instrumentis et Officiis Medici.* This Ms. was then in the hands of one of the sons of Flajanus, a surgeon, by whom it was expected that it would be published. I am not aware that it has yet been done.

Fortunately his *Opuscula Anatomica,* being a collection of small but valuable treaties containing an account of many of his original researches and discoveries, was published at Venice, in quarto, 1563.

It is generally conceded that he discovered the aural tube which bears his name. Eloy says, all the glory of this discovery belongs to Eustachius; others assert that he merely gave a more accurate description of it than any previous writer had done; that it was already known to Vesalius, and even anciently to Alcmœon, a disciple of Pythagoras, who was aware of the passage that led from the ear to the throat, inasmuch as Aristotle quotes him as saying, that goats breathed through their ears. So also with the stapes—Eustachius is among the claimants for its discovery. This is disputed by Fallopius, who affirms that he wrote concerning it to Cananus, Columbus, and Madius, but that not one of them knew of its existence. (Portal, *Hist. de l'Anat.*, v. i, p. 576.) Columbus and Ingrassias each contended for this honor, the latter declaring that he exhibited it to his pupils in Naples in 1546. Eustachius was the first who described the tensor tympani, as well as the stapedius muscle; he also gave a superficial description of the cochlea. He also discovered the supra-renal capsules, and the thoracic duct, of which he gave an accurate description of that of a horse, saying that it resembles a white vein, and opens with a semi-circular orifice into the internal jugular vein. He discovered the valve at the orifice of the coronary vein of the heart. He was the pioneer in the exact methods of investigation of the development and evolution of the teeth, having observed the rudiments or germs of both the temporary and permanent sets in the fœtal skull. He was equally minute in his researches in renal anatomy. He was the first to study these organs by comparison of numerous examples from different subjects, and also with those of the lower animals. He devoted a special work to this subject, *De renibus*, etc., in which he gives the first figures of the tubuli uriniferi, careful delineations of the mammillary eminences, and many other interesting things relating to the structure of the kidneys.

While Vesalius had corrected many of the anatomical errors of Galen, Eustachius performed the more difficult task of correcting numerous errors into which his distinguished contemporary had fallen. Thus by their united labors the science of anatomy made rapid strides toward perfection.

The following is the most complete list of the printed editions of his works that I have been able to compile:

De renibus libellus. 4° Venice, 1563, and in *Opuscula,* 1564. *De dentibus libellus.* 4° Venice, 1564. *Opuscula anatomica.* 4° Venice, 1564, 1574; with annotations by Pinus. 4° Venice, 1653; 8° Leyden, 1707; 8° Delft, (edition of 1574) 1736. *Erotiani, græci scriptoris, vetustissimi, vocum, quæ apud Hippocratem sunt collectio, cum annotationibus, Eustachii Libellus de multitudine.* 4° Venice, 1566; 8° Leyden, 1746, 1765; 8° Strasbourg. 1783. *Tabulæ anatomicæ Cl. viri Bartholomæi Eustachii, quas è tenebris tandem vindicatis, et Sanct. Dom. Clementis XI, Pont. Max. Munificentiâ dono acceptas, Præfatione Notisque illustravit Jo. Maria Lancisius Intimus Cubicularius, et Archiater Pontificis.* fol. Roma, 1714, 1728, 1740, 1783; Geneva, fol. 1717; published in Manget's *Theatrum anatomicum,* Cologne, fol. 1717, (thought to be more beautiful than the original edition); Amsterdam, fol. 1722; Leyden, fol. 1744, 1762. A commentary on these plates by Alex. Monro, was published at Edinburgh, 8° 1740; a Dutch commentary by Brown, Amsterdam, 1798, and one in German, by Kraus, in the same city, as recently as 1800.

EDITORIAL DEPARTMENT.

THE FUTURE OF ABDOMINAL SECTION.

General gastrotomy is as yet barely emerging from that first epoch in the history of every great advance in surgery in which successes are ignored or belittled, failures are magnified, and conservative minds are bewildered with the spectre of a ghastly innovation. We have already had our sporadic cases, speedily forgotten, or fiercely censured and then forgotten. Fifty years ago, Fuchstius opened the abdomen of a man suffering from constipation of ten days' duration, found two feet of invaginated intestine, reduced the gut, closed the abdomen, and saved his patient.

In 1827, Brodie, in the case of a woman, through a laceration in the anterior wall of whose rectum five or six feet of small intestine had escaped so as to protrude from the anus, incised the linea alba, pulled the escaped intestine up through the slit in the rectum and replaced it in the abdomen. The woman died twenty-three hours after the operation, and the *Lancet* with brutal merriment ridiculed the operator for "having performed the Cæsarian section for prolapsus ani!"

Since then many abdominal sections have been made with varying success, but no fixed principles have yet been established. At each consultation over a case of supposed tubal pregnancy, omental cancer, or intestinal obstruction, the question of operative procedure has to be discussed *ab initio*, or else it is ignored altogether. Probably a majority of our practitioners can still see no escape from the dreary dictum of Callisen: "*Ilei ab intussusceptione orti cura, si quæ data, certe est difficillima, neque ulla alia methodus indicata videtur, quamquæ inflammatione et spasmo convenit.*"

Nevertheless it is apparent that we are about to witness a systematic advance in abdominal surgery.

The triumphant establishment of ovariotomy as a legitimate and indispensable operation must be followed by the acceptance of gastrotomy as something better than a *derniér resort* in cases of obstruction, hemorrhage and neoplasm within the abdominal cavity. Truly it will never be denied that the cutting open of the abdomen is a dreadful operation ; but Keith has done it seventy times without a death, which proves that no person should be denied a last chance for life because the surgeon fears to cut the peritoneum. One obstacle to adoption of general gastrotomy is therefore removed. Two others remain : first, the difficulty in the most important cases of making an exact and timely diagnosis ; and second, the lack of precise knowledge of the normal and pathological anatomy of the abdomen on the part of the general practitioner. Both will melt away in the alembic of the determined student. In many cases the diagnosis need not be exact. It makes no difference to the patient whether he be dying from invagination or mesenteric rotation, provided, his medical attendant, aware simply of the danger, has courage to open the abdomen, and then possesses knowledge sufficient for the diagnosis, and the skill requisite for overcoming the difficulty. The problem, therefore, of dealing with cases of intestinal obstruction, of a character hitherto deemed hopeless, seems to be in a fair way of solution at the hands of the surgeon. In reference to abdominal tumors there remains the same uncertainty that exists in regard to tumors everywhere, but there seems to be no valid reason why they should not equally claim such relief as the surgeon can afford. Hitherto the progress of visceral surgery has been seriously impeded by the fear of uncontrollable hemorrhage from the wounded parenchyma, but now we know that from incised wounds in the liver, spleen and kidney the bleeding is unimportant except when a large vessel is divided, and thus this obstacle has vanished.

In the matter of tubal pregnancies a field is opened in which the diagnostic acumen, and the operative hardihood of the practitioner will be severely tested. It is a field in which in future gastrotomy will be a prominent figure, for by the wise use of this resource alone it is that the development of the misplaced embryo until it becomes a source of peril to the mother is to be prevented, or after the dreaded rupture has taken place, that its otherwise necessarily fatal results are to be in any possibility escaped.

THE CLINIC.

Sarcoma of Upper Jaw—Service of Pd. Asst. Surg. J. L. **Neilson**, Naval Hospital, Brooklyn. Extirpation.—Recovery. Male, aged 20 years. History of but six month's growth; tumor occupied entire buccal cavity, and protruded as an offensive mass about the size of an orange from the mouth. No cachexia, nor infiltration of the submaxillary glands. The tumor, including the most of the right malar bone and the entire right sup. maxilla was removed by Dr. Neilson, January 21, 1880. Hemorrhage trifling. Patient convalesced rapidly. Microscopical examination of tumor shows it to be a small spindle-celled sarcoma, with stroma of very transparent fine fibrous tissue.

Strangulated Hernia.—Hesse. St. Mary's Hospital, Brooklyn. Recovery. Single woman, aged 38 years, entered June 19, 1879. Had had tumor in groin for six months. A diagnosis of incarcerated hernia made. 5 P. M. June 21st, stercoraceous vomiting appeared, and Dr. Hesse operated immediately. Direct inguinal hernia of left side. Sac opened; intestine very dark; reduced; silk sutures; carbolized dressing. Discharged cured, August 1st, 1879. The temperature at no time rose above 38.5° C.

Strangulated Hernia.—Hesse. St. Mary's Hospital, Brooklyn. Recovery. Woman, aged 50 years. Femoral hernia; seven years' standing. Strangulated while wearing a truss, February 3, 1879. February 4th, Dr. Hesse drew off 12 *cc* serum with the hypodermic syringe; cut down upon the tumor; nicked Gimbernat's ligament; opened the sac; reduced the gut; ligated and cut off a portion of omentum, and stitched the stump to the walls of the canal; 2 per cent. carbolic dressings. February 9th, stitches removed. February 11th, bowels moved. February 25th, discharged cured.

Strangulated Hernia.—Byrne. St. Mary's Hospital, Brooklyn. Death. Married woman, aged 43 years, admitted December 17, 1879; had had rupture for six months; very ill for the past six days; bubo-like tumor in the groin; diagnosis of strangulated hernia; Dr. Byrne cut down immediately; opened sac; divided stricture; gut (apparently gangrenous) slipped without any taxis into the peritoneal cavity; a gush of feces from the wound followed; patient died that evening.

Cancrum Oris.—Merritt. Sheltering Arms Nursery, Brooklyn. Death. Joseph S., admitted July 1, 1879; aged 1 year and 10 months; emaciated; slight cough; diarrhoea; teeth very much decayed; unable to walk or talk; mother died of phthisis December 15th; mouth and tongue found to be sore; a swelling noticed in left cheek, which sloughed two days later, leaving a free perforation of the cheek. Local treatment of sulphate copper and powd. cinchona. Buccinator entirely destroyed. December 18th, purpura hemorrhagica over abdomen. Died December 20th.

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ANNALS
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ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

THE ANATOMICAL REASONS FOR DEXTRAL PREFERENCE IN MAN.*

BY JOHN A. WYETH, M.D.

WITHIN certain restrictions and exceptions, to be hereafter discussed, man is dextrous by preference, from an aggregation of causes referable to the general arrangement of the great vessels which pass from the heart to the head, neck and upper extremities. All of these conditions may or may not be present in every right-handed individual, yet the individual will be more or less intensely right-handed as one or more of these conditions exist.

An inversion of the arrangement usually found will induce a natural preference to be left-handed. This usual arrangement is such that the blood-supply to the right arm is greater than the left, while the supply to the left half of the encephalon is greater than the right.

The cause of this almost constant, and hence normal, arrangement, is the left obliquity of the heart, which again is caused by the development of the liver† on the right side, which pushes the apex of the heart to the left, and from its original position in the median line.

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* Delivered before the Society, December 1, 1879. The lecture was preceded by a short discussion of the views of Pye-Smith (*Guy's Hosp. Rep.*, xvi, 141, et seq.), T. Dwight, Jr. (*Psycholog. Journ.*, iv., 535), Hyrtl (*H'db'ch. Topog. Anat.*, ii), Ogle (*Med.-Chir. Trans.*, liv, 279, et seq.) and others.

† Liver weight, 1742 gms.; Spleen, 249 gms.

Therefore, if I am correct, the development of the liver on the right side—and the consequent displacement of the heart—is the cause of dextral preference in man.

It is an accepted fact that the left half of the encephalon is heavier than the right. Bastian says, the average specific gravity of the gray matter of the left half, is greater than that of the right.*

Dr. Boyd writes: † . "It is a singular fact confirmed by the examination of nearly 200 cases at St. Marylebone in which the hemispheres were weighed separately, that almost invariably the weight of the left half exceeded that of the right by at least the eighth of an ounce (3.9 gms.)" ‡

I believe that this increased weight of the left half of the cerebrum is due to a greater supply of blood to this side.

I cite the following case: In a subject I found in the dissecting room of the Bellevue Hospital Medical College, the left internal carotid was wanting, a small trunk taking the place of the common carotid and taking the distribution of the external. There was no carotid canal in the left side of the base of the skull. Nature had attempted to restore the equilibrium by various anastomoses, but notwithstanding the free collateral channels which were established, the right half of the encephalon weighed nearly fifteen and a half grammes more than the left, where the internal carotid failed. I presumed this man to be left-handed, and though I could not ascertain the fact I believe he was left-handed, because the muscles of the left arm were demonstrably better developed.§

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*Dr. Ogle.

† Philosophical Transactions, London, 1861, vol. cli, part 1, page 261.

‡ In four of five brains I weighed the left half was heaviest. [W.]

§ The biceps and brachialis anticus of the left side, for instance, weighed 4.49 grammes more than the same muscles of the opposite arm, dissected under similar conditions and weighed at the same time.

Again, in another subject in which the right half of the brain weighed 4.55 grammes more than the left, I found the measurements to differ in the two arms, held in the same position, in favor of the left side as follows:

Circumference of	Left Arm at wrist,	16	centimetres.
" "	Right " "	15.25	"
" "	Left forearm at middle,	17.75	"
" "	Right " "	15.5	"
" "	Left, one inch below condyles,	20.5	"
" "	Right, " " "	18	"

These cases I have given to sustain the argument that the left brain is heavier on account of increased vascularity, and that in the exceptional cases the individual will be noticeably left-handed.

That portion of the arteria magna which is usually called the arch of the aorta, does not form one continuous and unbroken curve, but is made up of three segments of circles, each differing in the intensity of its curve (see Fig. 1).

The first segment begins at the base of the left ventricle, and terminates where a line carried in the axis of the ventricle into the aorta would inpinge upon its upper wall. Just at this point is the dilatation known as the sinus magnus. This is the first retarding angle to the blood current, and it is here that it strikes with the greatest velocity against the aortic wall after it is driven upward by the ventricular systole.

There can be no doubt but that the blood pressure is greater here than at any other point, for two reasons: First, there is a natural dilatation at this point, due to pressure; and, second, this portion of the aorta is oftenest the seat of aneurismal dilatation.

It will be seen that the innominate, left carotid and left subclavian arteries arise in rapid succession from the transverse segment just beyond this sinus.

The arteria innominata, with its calibre larger than the left carotid and subclavian combined, is given off nearest the sinus magnus, and in its first portion is more favorably situated to invite the ascending column of blood than either or both the other vessels.

This portion of the blood current which has been deflected by the first retarding angle—the junction of the first and second segments of the aorta—passes most readily into the innominate, and strikes the second retarding angle on the left upper and anterior wall of this artery at a point about one centimetre above its origin. From this point the deflection is in the axis of the arch of the last portion of the innominate, which is backward, upward, and to the right, and is directly continuous with the arch of the right subclavian. Now, you will observe that while the right subclavian is a direct continuation of the last part of the innominate, the right carotid is derived from the anterior surface of the innominate, and travels in an oblique direction upward toward the carotid canal, and away from the axis of the blood current in the innominate.

By virtue of its more fortunate position then, the right subclavian receives the greater part of the blood which enters the innominate.

Let us compare the unfavorable relation of the left subclavian to the vessel we have just considered.

The vessel going to the left arm comes off from the transverse segment of the aorta at almost a right angle to this portion of the arch, and consequently at the same angle to the current of blood which is passing along this portion of the arteria magna.

I hold, then, that its origin and direction are unfortunate, its relations being such that the current of blood cannot enter it so readily as its more fortunate fellow of the opposite side.

In regard to the comparative size of the right and left carotid and vertebral arteries, Dr. Ogle says that he has noticed "that the arteries which carry blood to the left side of the brain are largest as a rule."

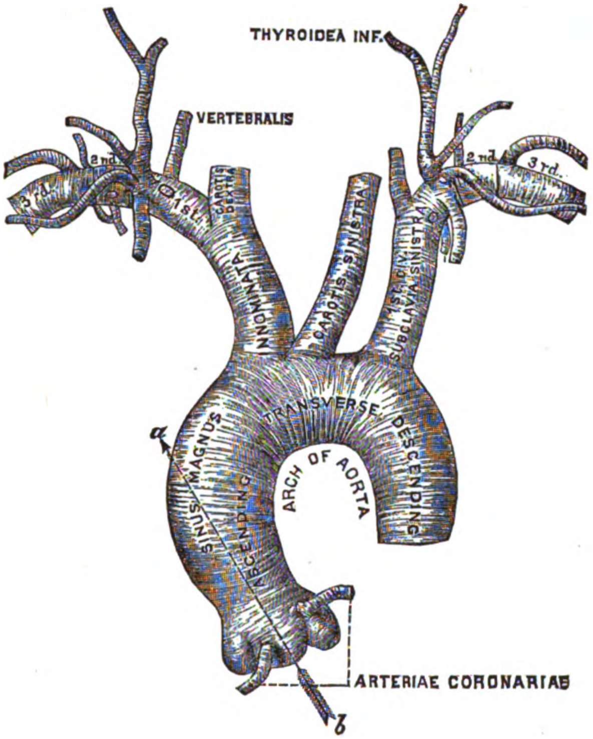


FIG. I.—THE ARCH OF THE AORTA AND ITS BRANCHES.

I believe that this assertion is correct, although there are many sources of error in the comparative measurements of blood-vessels, especially when they are injected. It is customary to insert the injection tube into the right carotid near the bifurcation, and this would distend this vessel above its normal size, since the last force of the injection will be expended upon it.

In fifteen injected cases, taken consecutively, I found the left longer by three millimetres or less in nine. In five they were so near the same size that I could not determine any difference. In the remaining case the right was largest.

After having made more than one hundred dissections of these arteries, in injected and non-injected subjects, I am satisfied that the left is largest as a rule, though not larger than the right in the proportion of right to left-handed individuals.

If a study of the two common carotids is made, it will be seen that the relation of the left is more favorable for the influx of the blood current than the right.

The left carotid arises side by side with the innominate, there being on an average only 1.09 centimetres between the centres of the two vessels and its direction throughout its entire length is in the axis of the current, which is reflected from the first retarding angle.

The right carotid, as I have before shown, is more unfortunate in its position, being derived from the anterior aspect of the innominate, and traveling obliquely upward, two conditions which render it less likely to receive its full share of the blood in the innominate, and which place it decidedly at a disadvantage to its fellow, which is distributed to the left half of the brain.

The vertebral arteries have much less importance in connection with right-handedness than the four vessels already considered, since only one branch—the inferior cerebellar—is distributed to the cerebellum before they unite to form the single median trunk called the basilar. Yet that it does exert some influence toward dextral preference, however small, I do not doubt. In twenty-two cases I examined consecutively, the left vertebral was largest in twelve, they were the same in five, and the right was largest in five.

My explanation of this is also one of position. In twenty-six consecutive dissections of the left subclavian, I found the vertebral derived in twenty-three of these just where the subclavian turns suddenly and sharply outward to arch over the rib. Its direction is more nearly in the axis of the thoracic portion of the parent trunk, and is consequently in the axis of the blood current, traveling upward into the left subclavian from the arch of the aorta.

On the other side the right vertebral has an unfortunate position, in that it travels at nearly a right angle to the axis of the right subclavian. (See Fig. 1.)

Lastly, as to the relation of the development of the liver upon the right side to dextral preference.

Prof. Flint, Jr., in his Physiology of Man, says:

> "In the arrangement of the vessels for the first circulation of the embryon, the heart is situated exactly in the median line, and gives off two arches which curve to either side and unite into a single trunk at the spinal column below. As the septum between the two ventricles makes its appearance at the second month, that division of the right aortic arch which constitutes the vascular portion of one of the branchial arches disappears and looses its connection with the abdominal aorta." (p. 932). * * * "During the sixth week the heart is vertical and situated in the median line with the aorta arising from the centre of its base. At the end of the second month it is raised up by the development of the liver, and its point pressed forward. During the fourth month it is twisted slightly upon its axis, and the point presents to the left." (p. 934).

If the heart had remained exactly in the median line, and if the two original aortæ had been permanent, there would have been a more equal supply of blood to the two halves of the encephalon, and consequently a less intense inherent impulse to use one side of the body by preference.

Man would have been more evenly balanced and more nearly ambidextrous, although he must, even under these conditions, have used one side more than the other for certain characteristic actions, requiring a single hand.

It may be objected to the theory I advocate that the excessive development of the left brain is an effect of dextral preference, and not a cause as I have argued. That education will change an individual from being left to right-handed.

There is no doubt but that a prolonged and energetic effort to use the left hand, even in those of us tenaciously right-handed, would succeed in making us equally expert with the non-preferred hand, but this would be the result of severe muscular and mental training. It is accepted that mental effort increases the flow of blood to the brain. This surplus of blood is due to relaxation of the vaso-motor nerves of this side, and by constant effort would become a natural and uniform condition, resulting in enlargement of the blood-vessels of the right side of the encephalon and an increase of brain weight.

In such cases the excessive weight of the right half of the brain would be the effect and not the cause of left-handedness. But such cases are exceptional, and cannot be advanced as sound arguments against the theory I have given, which is founded on an almost constant anatomical arrangement of the heart and great vessels of the neck, which arrangement results in the process of embryonic and fœtal development. Again, it will be asked, why are not all subjects with transposed viscera left-handed, if, as I hold, the location of the liver on the right side is the cause of Dextral Preference?

It will be part of the answer to this to say, that all subjects with the liver on the right side are not right-handed. Since there are exceptions to the normal conditions, there must be to the abnormal or transposed conditions. Moreover, we must admit the influence of heredity in children of parents, themselves the offspring of long lines of right-handed ancestors. This instinct of heredity would probably be a factor of right-handedness in one whose heart and great vessels were not in the usual position. And the same argument will not be inappropriate in those exceedingly rare instances of right-handed persons where the right subclavian is derived from the descending aorta, and where its relations are more unfortunate than the left.

I have been surprised since I have been studying the subject of dextral preference, that the proportion of left-handed children was not greater. A right-handed mother or nurse holding an infant to the breast, or carrying it when it is not nursing, will almost invariably carry the child on the left arm. In this position its right arm for a considerable portion of the first year of its extra-uterine existence, is pressed helplessly between its body and that of its attendant, while the left arm is free to be used, and is, as I have observed, more freely exercised than the right, which is preferred when the upright position is assumed.

This inherent impulse in man to prefer the right hand asserts itself under disadvantageous, extraneous conditions, as it does even in abnormal anatomical conditions.

Mr. Charles Reade, in his letters on "The Coming Man," asserts that "every child is even and either handed till some grown fool interferes and mutilates it." That "custom, [the mother and nurse] is at war with nature," [the child.] That "the poor little Primeval [ambidextrous by nature] stretches out the nearest hand for a toy; the woman puts back the nearest hand and until the child will defy nature and stretch the right hand across the body, it does not get the coveted toy."

The moral of these letters by the distinguished Englishman, is, that children can be and should be trained to be equally clever with both sides of the body, that by so doing their physical development is of a higher order, and they become more useful members of society.

I do not agree with Mr. Reade that "every child is even or either handed," until it is trained to prefer the right. My argument has been submitted, and I will not repeat it.

With him, I do not believe that the slight balance of the viscera on the right side, or the location of the liver weight on that side, would make man right-handed. It is not a matter of avoirdupois. It is a matter of room, a result of the heart crowded to the left and held permanently in a position to favor one side a very little more than another in the systemic circulation.

The author of "The Coming Man," is again in error in saying "when the viscera are transposed and preponderate to the left, the man is right-handed all the same." Hyrtl cites two cases of left-handed individuals with the viscera transposed. There was no doubt about one of these cases.

Mr. Reade again says:

> "The theories of Broca are still more chimerical. He pretends that the left hemisphere of the brain is larger than the right, and thinks it has the sole control of the right-hand movements. Here we have a statement and a juvenile divination: the statement is not supported by English measurements of the brain in young people; we find that sometimes one lobe is heavier and sometimes the other; the divination is not supported by a particle of evidence, and is contradicted by evidence; for three right-hand paralyses out of five are connected with a lesion of the right lobe of the brain. Cross-paralysis is very common; but direct paralysis is more common!"

Any man who takes the trouble to inform himself, should know that Broca is correct in what Mr. Reade terms a presumption, that the left half of the brain is heaviest. Dr. Boyd's measurements of nearly two hundred brains at St. Marylebone has settled this point conclusively.

As to the two halves of the brains of new born infants, I am not aware that any such extensive researches have been made.

Moreover, the assertion that "three right hand paralyses out of five are connected with a lesion of the right lobe of the brain," and that "direct paralysis is more common" than cross paralysis, I simply state that it is directly contrary to the experience of men who have spent their lives in treating such cases, and have benefitted by the *post-mortem* examinations of the brains of paralytics.—(See Flint, Sr., Aitken, and Niemeyer, as examples).

While I cannot endorse Mr. Reade's methods of discussing scientific points in connection with this subject, I do heartily endorse his broad philanthrophy and the earnestness with which he appeals to those most deeply interested in the early training of human beings to give them the benefit of as much ambidexterity as is possible. Individuals who are clever with both hands are more useful members of society than the one-handed. I think children should be trained to use both hands, giving a slight preference in training to the left for the first few years, since the inherent tendency to use the right will assert itself and result in a nearer even usefulness of both hands.

Finally, I repeat my position in this synopsis:

1. Man is right-handed by preference, as a result of his anatomical development.

2. The arrangement of the embryonic protoplasmic elements is such that the liver developing on the right side, greatly outgrows its opposing viscus, the spleen, and pushes the heart to the left of its original position in the median line, causing an obliteration of one of the two originally symmetrical arches of the aorta, and an obliquity of the remaining one.

3. This loss of symmetry involves an arrangement of the great vessels of the neck and upper extremities, by which the artery carrying blood to the right arm is more favorably situated and receives more blood than the one to the left arm, while the left carotid and vertebral arteries, supplying the left half of the encephalon, which presides over motion on the right side of the body, are more favorably

situated and convey more blood than the two vessels which have the same distribution on the opposite side.

4. This fact accounts for the development of the left half of the brain in excess of the right.

5. It is not the slight excess in weight of the viscera of the right side of the abdomen, which is given by some to be the cause of right-handedness, who argue from this that man must lean to the left, *i.e.*, balance himself upon the left leg, leaving the right extremities freer for action. It is a matter of cubic inches, of bulk, in fact of *cardiac displacement.*

6. Education, training by persistent effort, will overcome the natural tendency to dextral preference and will render the individual more clever with the non-preferred hand; more equally adroit with both sides of his body; more symmetrical in muscular growth, will tend to equalize the two halves of the brain, giving a better cerebral development, and will consequently render him more serviceable to society and himself.

Society Reports.

STATED MEETING, JANUARY 19, 1880.

THE SURGICAL TREATMENT OF FACIAL NEURALGIA.

FIRST ARTICLE.

GEORGE R. FOWLER, M.D.,

DEMONSTRATOR OF OPERATIVE SURGERY TO THE SOCIETY; SURGEON TO THE BUSHWICK AND EAST BROOKLYN DISPENSARY.

CASE.—On January 27, 1877, there came under my care G. W. Meyer, a German shoemaker, aged 53, the subject of a persistent and intractable facial neuralgia of the left side, of eighteen months duration, the superior maxillary division of the fifth nerve being principally affected.

All medicinal measures designed for his relief proving unavailing, he at last when driven to the point of committing suicide consented to the performance of an operation for his relief.

This operation consisted of an exsection of the superior maxillary nerve directly after its exit from the cranium through the foramen rotundum, and the extirpation of Meckel's ganglion by the method hereinafter described.

The operation was a complete success, the pain ceasing at once in the tract supplied by the superior maxillary nerve. The inferior dental branch occasionally was the subject of slight pains, but these finally disappeared.

The patient resumed his occupation, and for the rest of his life remained free from neuralgia. Nearly a year afterward he died of cirrhosis of the kidneys.

In my absence my friend, Dr. Pilcher, conducted the *post-mortem* examination. The lesion of the kidneys had been previously diagnosed, and excited but little interest. An examination of the base of the brain and of the parts involved in the operation revealed an entire absence of all traces of a reproduction of nerve tissue. A neuroma the size of a pea was found within the cranium, springing from the superior maxillary or second division of the fifth nerve, at the point where it leaves the Casserian ganglion, and just previous to its entrance into the round foramen of the sphenoid bone.

A microscopic examination of the tumor, nerve and ganglion by Dr. J. C. Shaw revealed nothing of especial interest. The tissue of the nerve and ganglion was normal. The neuroma partook of the general characters of that class of tumors when found elsewhere.

The question naturally arises, was the neuralgia dependent upon the existence of this tumor, or did the tumor develop as a consequence of the operation, just as such growths are known to spring from the stump of a nerve which has been subjected to traumatism, as in an amputation? My own opinion is that the neuroma existed prior to the operation, and was the cause of the neuralgia.

The surgical treatment of cases of facial neuralgia of obstinate character, especially those operations consisting of the division of the trunks of the nerves involved, or the excision of a greater or less portion of their continuity is now recognized as proper and legitimate.

Since the first introduction of neurotomy and neurectomy the subject has undergone several remarkable changes in the professional mind; the good effects of operative procedures being at times greatly exaggerated and their practice strongly recommended, and later the most vigorous condemnation having followed their performance.

As is usual, where theories and views diametrically opposed to each other, are held by men of equal repute and learning, the truth lies here midway between.

In the times of Albin and Marechals, when the practice of cutting all nerves supplied to affected parts without regard to their function was held to be necessary, many needless operations were done, and much damage inflicted. This soon led to a reaction which resulted in an entire rejection of all operative measures for the relief of facial neuralgia.

In a few years, Haighton's numerous aud favorable experiences led to another exaggerated extension of operative interference; the teachings of Physiology were here also disregarded, and it was not until the powerful voices of Sir Charles Bell, Dieffenbach, and Romberg, were raised in opposition to it that it fell into comparative disuse. These great men, however, offered little in the way of ameliorating the dreadful sufferings incidental to neuralgia of the nerves of the face, and there has again risen to the surface the practice of dividing and resecting the nerves involved. An increasing number of surgeons are actively engaged in the scientific and technical perfection of these operations, notwithstanding there were, until quite recently, eminent men—notably Stromeyer and Weber—who, in their special treatises upon the subject, declared these operations to be inadmissable.

It is to be feared that the judgment pronounced against these measures by so weighty and powerful an authority as Stromeyer may lead to a total neglect of the operations, and it may therefore not be deemed inadmissible to offer a few observations upon the value of surgical interference in this class of cases, hoping to be able to show that, within certain limits, it is good practice.

In the present state of our knowledge, the surgical treatment of facial neuralgia, may be limited to five different operative procedures, viz.: neurotomy, neurectomy, neurectomy with removal of ganglia, arrest of arterial blood supply, and nerve stretching. Of these I propose to dwell upon neurotomy and neurectomy.

In neurotomy, as well as in neurectomy, upon nerves distributed to the face, the operation is clearly indicated in cases of peripheral neuralgia of purely sensory nerves. If performed upon mixed nerves the resulting paralysis is such as to lead to considerable deformity and slow recovery; in fact, in a certain proportion of cases, the motor power of the facial muscles is never restored.

In view of the impossibility in many cases of locating the precise seat of the neuralgia, and likewise of determining whether it is of central or peripheral origin, it is justifiable to divide the nerve, or resect a portion of its trunk at as high a point as it is possible to reach.

When we bear in mind that in the vast majority of instances the pain returns when the divided ends of the nerve become reunited after a simple neurotomy, we would hope to benefit our patients more by performing neurectomy in preference to neurotomy, when the former is at all admissible.

The rule is ordinarily laid down that these operations are only applicable to neuralgias of peripheral origin; that when the origin of the disease is central, no benefit can be derived from a division or resection of the trunks of the nerves leading to the periphery. Some very brilliant results obtained by Wagner, Nüssbaum and Nélaton strengthen the opinion that even many of these otherwise hopeless cases may be benefited by the resources of modern surgery.

It is difficult to understand how these cases of central neuralgia are benefited by neurotomy or neurectomy. Probably the explanation offered by Erb is the correct one, viz: "that in neuralgia of central origin the several attacks are induced by the application of slight sensory stimuli to the periphery." After section of the peripheric nerves these stimuli are no longer conducted centripetally, and the immediate causes of the paroxysm are removed. If in this manner the operation only interrupts the painful excitation of the unhealthy nerve centre which follows peripheral irritation, and a regeneration of the nerve tissue leads to a repetition of the paroxysm, still it is to be contended that the patient is entitled to the respite which may thus be gained.

In addition to this Wagner advances the opinion that the excitability of the nerve tracts and central apparatus being suspended by the interruption in the centripetal current of peripheral irritation, sufficient time is gained for the removal of the original source of the peripheral irritation, if any exists, as well as for the quieting of the central excitability. The quieting of the central excitability by the interruption of the current proceeding from a peripheral irritation would have the effect of relieving the irradiated sensations of pain in other nerve branches.

It is occasionally noticed that after the operation of neurectomy the pain ceases for the first few hours, afterward returning with all its original intensity. This is undoubtedly due to the swelling about the stump of the nerve.

The organic changes which occur after the operation of neurotomy and neurectomy are of some moment. The traumatic irritation of the proximal end resulting from the exposing and cutting through of the nerve, is of short duration, usually subsiding before the patient is fully recovered from the anæsthetic. It is not uncommonly observed that pain of severe character referred to the peripheral extremity of the nerve tract follows immediately after the operation, passing over in a few hours, and in very exceptional cases, days. Occasionally paroxysms of pain, exactly simulating those for the relief of which the operation was performed, occur after two or three days, and both patient and surgeon are likely to be deceived and discouraged thereby. They are, however, eccentric symptoms of a secondary traumatic irritation resulting from the pressure of inflammatory products, effused blood, pent up pus, etc., always disappearing upon a removal of the cause, and with a decrease of the inflammatory reaction.

Another condition which may give rise to a return of the pain, independently of the condition which originally produced the neuralgia is the compression of the swollen wounded end of the resected nerve in its bony canal. The wounded swollen end of the resected nerve is composed principally of young connective tissue, through which course small nerve filaments. After a period of time has elapsed, we may confidently look for an atrophy of the stump of the nerve due to the shrinking or contracting process which all regenerated connective tissue undergoes. Should the pain persist and be suspected to be due to this cause, a further operative procedure consisting of a breaking down of the bony canal, would in all probability be effectual.

Again there will occur cases in which a return of the pain is due to the fact that the nerve stump has become intimately incorporated with the cicatricial tissue formation in the process of healing. Here the contraction of the new connective tissue is a very decided disadvantage, and to it may be traceable the recurrence of the neuralgia. In these cases the paroxysms of pain occasionally cease when pressure with the finger is made upon the cicatrix, and return when the pressure is removed. There is no doubt that this is frequently the cause of a recurrence when the pain returns, after being absent, in a few weeks; in these instances it being supposed that the divided extremities of the nerve have in the case of a neurotomy become re-united directly, or, in the case of a neurectomy, by the interposition of nerve filaments developed in the cicatrix; whereas it is really a case of simple peripheral irritation, due to mechanical causes. The proper resource here is a total extirpation of the cicatrix and primary union of the wound; this, in a majority of cases, leads to a permanent cure.

In order to avoid the last-named source of a return of the neuralgia as much as possible, it is desirable to obtain union by first intention of all divided parts involved in either neurotomy or neurectomy.

The limited number of pathological changes present, and recognized in connection with neuralgia of the facial nerves leaves hope that there will yet be discovered more palpable alterations in the structure of these nerves, and upon the knowledge thus gained a more rational treatment than can now be offered, be based.

When we contemplate the dreadful sufferings with which we have to deal; how inexpressible the torture, and how discouraging the prospect of relief from the mere administration of drugs in persistent neuralgia, I think that we will fall far short of our duty if we refuse the patient the benefit of any operative measure, the performance of which holds out any hope of immunity from suffering. Few, it is to be hoped, will agree with Stromeyer that a freedom from pain for fourteen months is immaterial and not to be taken into account in forming our judgment as to the propriety of operating.

Many surgeons of the present day will agree, I think, that these operations are not of less value than those performed for the extirpation of painful malignant growths which are likely to recur. These latter operations are but palliative, and are performed by the surgeon with the understanding that a lasting cure is not to be hoped for therefrom. In the case of neurotomy and neurectomy, on the contrary, there is an almost absolute certainty of immediate relief, the operations themselves are far less dangerous to life, and, as the following statistics will show, hold out a reasonable hope of cure.

Wagner has collected 135 cases of neurectomy, eighteen of which were performed by himself. Of these 135 cases in nine the results were purely negative. In six cases, a fatal result followed. In one case the pain reappeared immediately after the operation. After a period of several months, the pain had returned in thirty-two cases. In twenty-five cases the patients remained free from pain for three years, the pain then returning. In eighteen cases the patients remained under observation less than a year, and no return of the pain had then taken place. In twenty-five cases, the patients being under observation for periods longer than three years, no recurrence of the neuralgia took place. In twenty-four cases the results remained uncertain.

INTRA-UTERINE FIBRO-SARCOMA.

JOHN BYRNE, M.D.

Dr. Byrne presented microscopic slides illustrating the histology of a case of intra-uterine tumor, which he had recently removed by operation. As shown by the sections presented, it belonged to the class of fibroids, but in his manipulations upon the growth he had not been able to detect any trace of a capsule enclosing it, and this fact he considered to be remarkable, as it was the first case of the kind in this class of tumors he had personally met with. The following is the history of the case:

On December 13, 1879, I was requested to see Mrs. ——, aged 42, the mother of six children, the youngest 13. Her family physician, informed me that until the winter of 1876–77 she had always enjoyed the best of health ; she had had no miscarriages, and no disturbances of menstruation, except during pregnancy or lactation.

Her first illness was a severe attack of bilious colic, accompanied by vomiting, constipation and other symptoms, believed to be due to hepatic obstruction. During the succeeding twelve months she had repeated attacks of a similar nature, but always ushered in by spasms of an epileptiform character, and each time, as the paroxysm spent itself, she became deeply jaundiced. Finally, anasarca, ascites and hydropericardium set in, and for a time her recovery seemed impossible, but ultimately these alarming complications disappeared, and her general health improved slightly.

In January, 1879, she was taken with what might be considered the first very severe attack of menorrhagia, though the catamenia had been gradually becoming more profuse for some months previously. From this time the intermenstrual periods began to grow shorter and more irregular, so that for the last six months the flow has been almost continuous, and the slightest muscular exertion is followed by copious hemorrhage and excruciating pelvic pains. It is proper to state that a diagnosis favoring the existence of polypus had been arrived at previous to my seeing her.

I found her condition, as might be expected from such a history, truly deplorable. To the yellow tinge of the skin, which had never wholly disappeared, was now added a suggestive pallor, and an expression of helpless and hopeless anxiety characteristic of long physical suffering and exhausted powers of endurance. Owing to great dyspnœa on lying down, and a tendency to increased pain and hemorrhage when supported in the erect sitting posture, she was compelled, almost constantly, to assume a semi-recumbent position in bed.

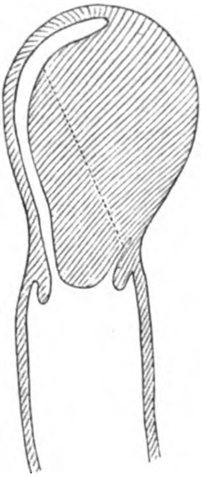
Her pulse was feeble and rapid, and on examining the heart, a systolic bruit was detected, while the liver was found to be somewhat enlarged, and quite tender on pressure, particularly over its anterior lobe. On placing the hand over the hypogastrium, a firm and irregularly spheroidal tumor, the size of a uterus at four and a half months gestation, was found occupying a position not quite central, but slightly inclined toward the left.

A vaginal examination was now made by carrying a finger cautiously up to the cervix, the uterus being steadied by the left hand externally, when a hard, smooth tumor was felt immediately within the os, and seemingly occupying the entire cavity. So far as the finger could reach and sweep around the presenting mass, it appeared to be free and detached, and any further investigation as to its character or the extent and nature of its attachment being deemed unwise, the diagnosis arrived at was *uterine fibroid, probably pedunculated.*

An operation with a view to its removal was advised, and though the employment of any anæsthetic was considered unsafe, she readily consented.

December 18, the patient having been placed on the left side and the uterus brought into view by a Sims' speculum, a sound was passed into the cavity, in a direction toward the right and somewhat posteriorly, to the extent of six and a half inches. On withdrawing the sound and attempting to carry it into the cavity in any other direction, it was found impossible to do so, as it was arrested to the left and anteriorly at a point about three-fourths of an inch from the entrance. When again introduced as in the first instance, and an effort made to sweep around the tumor, the latter was now found to be sessile, its attachment occupying the entire left half and a portion of the anterior wall of the uterus as far as and including part of the fundus..

The tumor was now seized by a strong vulsellum, and, in order to afford space for manipulation, the cervix was incised bi-laterally by galvano-cautery to the fullest extent practicable. Surmising that at least some considerable portion of the tumor might have its attachment to the uterine wall by loose cellular tissue, an attempt was next made to break up its connections, first by the index finger, and subsequently by means of a detached half of a flat-bladed polypus forceps. This instrument, being very deeply serrated, so that its edge was rough and saw-like, acted precisely in the same manner as the invaluable device of Dr. Thomas for similar purposes, but beyond the separation of a very small portion at the lower part, its most energetic application produced no effect whatever on the dense fibrous substance with which it came in contact, and further efforts in this direction were abandoned.



INTRA-UTERINE FIBRO-SARCOMA.

It now became a serious question as to the advisability of proceeding further, since a considerable amount of blood had already been lost, and the patient's courage, as well as her strength, seemed fast ebbing; nevertheless, as between abandoning the case at this stage, with no hope whatever of recovery, and risking her ability to live through a careful dissection of the mass from the uterus, there appeared but little choice, I decided to proceed as follows:

Knowing that it would be impossible to dissect off the tumor entire, with so little space for manipulation, a loop of the galvano-cautery ecraseur was, with much difficulty, adjusted, so as to embrace a large portion, say one-third, as shown by the dotted line in the cut. The excision of this part, which occupied but a few minutes, was thus accomplished without additional loss of blood, and its removal afforded ample space for the next and most critical step in the operation.

The remainder of the tumor was now firmly seized by a strong vulsellum, and by means of curved scissors the process of cutting through its base was cautiously proceeded with from below upward, and the entire mass thus removed piecemeal.

Though this part of the operation occupied more than half an hour, there was but little blood lost, and as stimulants and restoratives had been freely administered from the beginning, her condition was on the whole fair, considering that *she had now been nearly two hours on the table, and without any anæsthetic.*

From the extreme hardness and density of the tissues through which the scissors passed, and the estimated thickness and cartilaginous feel of the remaining uterine wall, coupled with the fact that *there was a total absence of anything resembling a capsule*, it seems quite probable that this large portion of the uterine body had undergone more or less diffuse fibrous degeneration.

The uterine cavity having been carefully sponged out, the entire surface from which the tumor had been excised was now thoroughly cauterized by means of the dome-shaped instrument devised for such purposes, and an anodyne rectal suppository having been administered, the patient was put to bed.

The subsequent history of this case, which was singularly and happily monotonous as regards serious complications and drawbacks, as well as the after management and treatment, may be very briefly stated.

December 19th, twenty-four hours after the operation I found the patient quite cheerful, she had rested tolerably well during the night, and had taken and retained a fair amount of nourishment. She only complained of an uncomfortable "aching all over" and a feeling "as if she had been pounded."

On the third day she had a slight chill followed by a rise of temperature (102°), but without any local manifestation of pelvic or peritoneal inflammation, and no gastric disturbance. She was ordered full doses of quinine and opium, intra-uterine douches of warm carbolized water were employed twice daily, and in twenty-four hours all threatened complications had passed over.

On the fifth day a copious purulent discharge mixed with particles of eschar and debris of fibrous material commenced and was kept up, but in gradually decreasing quantity for three weeks, when it finally ceased. It is also worthy of mention that no special precautions or topical measures of a hæmostatic nature, beyond the thorough cauterization of the wound as already stated were resorted to, and there was no secondary hemorrhage whatever. Her progressive improvement now became more marked, and nothing worthy of note occurred until the end of January, nearly seven weeks after the operation, when she was alarmed by the appearance of a sanguineous discharge accompanied by some pain, and which having continued for three or four days, I was again requested to see her. I found her much depressed in spirits and nervously apprehensive, lest the disease for the cure of which she had made such heroic sacrifices, had returned. In this anxiety, I fully but tacitly concurred and proceeded to make as careful an examination as circumstances would permit.

I found the uterus quite moveable in all directions, and though still somewhat enlarged, not remarkably sensitive to such manipulation. On introducing a speculum, the most noticeable fact observed was the singularly normal appearance of the cervix, though trachelotomy had been performed but six weeks previously, and that too by galvano-cautery. Indeed, so little deformity was there that the most inveterate stickler for oral or cervical symmetery might have been satisfied, nor could the laceration hunter however exacting, find any excuse for the display of his gynæchirurgical dexterity. The flow which was observed slowly oozing from the uterus did not present the appearance of active hemorrhage, but was in fact menstrual, and the cavity measured but little over three inches in depth, while on carrying the sound cautiously over its walls, especially the left, I could notice no irregularity of surface and no hyperæsthesia, nor was there any increase of the discharge following this examination. As a precautionary measure, however, she was advised to maintain the horizontal position for a few days, and to continue the use of quinine and iron which she had been taking for some weeks previously.

Addendum. March 5th.—I made my last visit to her. Had I entertained misgivings as to how I should find her, the alacrity with which she hastened down stairs, and her happy and cheerful manner would have quickly set at rest all such doubts. She informed me that her appetite was excellent, that she slept well, and was amply able to superintend the duties of her household as formerly, but that she could not take much out-door exercise on foot without considerable fatigue. There has been no return of the catamenia up to the present time, and her physician informed her after an examination one week ago, that "the womb had been restored to its natural size."

NON-ENCAPSULATED UTERINE FIBROID.

WALTER B. CHASE, M.D.

In response to a question from Dr. Byrne respecting the experience of other members of the Society concerning fibroid growths without a capsule, Dr. Walter B. Chase said:

About eighteen months since I was asked to operate for the removal of a sessile fibroid tumor about the size of an English walnut, occupying the anterior portion of the cervix uteri and presenting just inside the os.

A digital examination revealed what I supposed to be a fibrous polypoid, but on dilating the cervical canal I found it to be a submucous growth, and seemingly well defined. From its position and size I expected to be able to enucleate it with a scoop or blunt cutting instrument, but failed in the effort and was compelled to excise it with curved scissors.

It was not so dense in structure as the case referred to by Dr. Byrne, presenting the ordinary appearance of an uterine fibroid. I was unable to find anything like a capsule in or surrounding the growth, which was to my mind the principal point of interest in its history.

MICROPHOTOGRAPHS.*

CHARLES JEWETT, M.D.

Dr. Chas. Jewett presented, with the following remarks, a series of microphotographs of amphipleura pellucida, donated to the society by Dr. J. J. Woodward:

These photographs were made for the purpose of demonstrating the superiority of the new microscopic objectives for homogeneous immersion. These objectives are corrected for immersion in a fluid having the same refractive index as crown-glass (oil of cedar-wood is such a fluid).

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* Presented at the meeting of February 16, 1880.

The objective thus immersed, its front, the immersion fluid and the cover-glass, form an optically homogeneous medium. There is consequently no aberration at the upper surface of the cover-glass, no aberration nor loss of light by reflection at the lower surface of the objective. Screwcollar corrections are dispensed with, greater width of angle is rendered possible, and the performance of these objectives surpasses the best results hitherto obtained with glycerine or water immersion.

Dr. Woodward, in a paper published in connection with these photographs, calls attention to a fact that is not yet sufficiently understood by microscopists. I refer to the importance of high-angled objectives for the purposes of the histologist. Other things being equal, defining power increases with angular aperture, and this is true with central illumination as well as oblique.

Objectives for histological research should be the highest angles of the best makers.

FRACTURE OF THE POSTERIOR LIP OF THE ACETABULUM.*

H. O. WALKER, M. D.

A communication was received from Dr. H. O. Walker, of Detroit, Michigan, accompanying a specimen of fracture of the posterior lip of the acetabulum. The specimen was presented to the society and demonstrated by the President. It had been removed from the body of a male, aged 78 years, who had been struck in the back by a street car, while on his hands and knees, and had suffered other injuries which proved fatal within a few hours. At the autopsy it was observed that the head of the left femur had been forced upward between the wings of the ilio-femoral ligament, extending nearly up to the brim of pelvis, midway between the anterior and posterior superior spinous processes. The ligamentum teres and the greater part of the posterior half of the capsular ligament was torn away, leaving a part of the anterior portion, together with the ilio-femoral or Y ligament. The muscles of the lower gluteal region at the femoral attachment were more or less ruptured.

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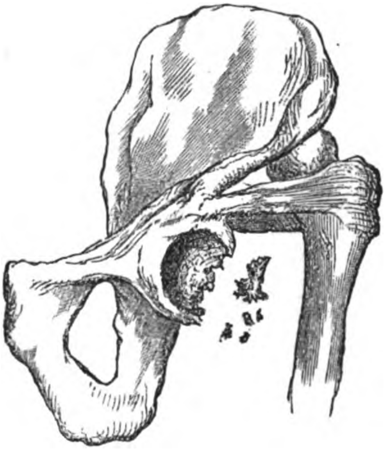
* Presented at the meeting of March 15, 1880.

The rim of the acetabulum was fractured posteriorly, as seen in the specimen presented (see Fig.).

The fragments were all detached and picked out from the cavity that had been made by the head of the femur. An opening through the posterior wall of the joint was thus made, through which the head of the bone could readily escape, leaving a little less than a third of the depth of the cotyloid cavity intact as a support to the head of the bone posteriorly.


FRACTURE OF POSTERIOR LIP OF ACETABULUM.

In reference to such injuries, Dr. Walker remarked:

An extensive fracture of the rim of the acetabulum is of rare occurrence, and the positive evidence of such a fracture a still greater rarity.

In looking over numerous works on surgery I have been able to find but very little pertaining to this fracture, a careful examination of the *London Lancet*, since 1823 up to the present time, reveals but two cases, and one of these, reported by Brodie in 1833, was a supposed case, owing to an inability to keep the head of the femur in place. The other, reported by Chas. H. Moore, in 1851, was only discovered many years after the occurrence of the injury; the patient having died from pneumonia, an examination of the hip revealed a stellar fracture of the acetabulum, with a portion of the rim detached allowing the femur to slip upon the dorsum forming a false joint. The standard works upon surgery give the subject only passing notice, to the effect that this fracture does occur, and that great difficulty is experienced in keeping the head of the femur in place.

The symptoms of this fracture point to a dislocation, with a difficulty, if not an impossibility, of retaining the head of the femur in place. The crepitus, when recognizable, is generally manifest at the commencement of manipulation, and will distinguish it from a fracture of the neck in connection with displacement, as in the latter the crepitus is not felt until the broken surfaces of the bone are brought in apposition.

The production of this accident is generally occasioned by a heavy weight striking the back, the thigh being flexed at right angles, or nearly so, with the pelvis, and possibly with a slight adduction or abduction.

I think it probable that in many dislocations of the thigh upon the dorsum ilii, there is a strong liability to a greater or lesser detachment of the rim of the acetabulum—but that it does not interfere with maintenance of the reduction, and that it is only in an extensive fracture of this kind that we meet with inability to maintain reduction.

In this latter case it has occurred to me to recommend the application of a plaster Paris bandage, extending from the ankle to umbilicus, and the placing the patient as soon as possible on crutches, and the wearing of an elevated shoe upon the well foot, so that extension would then take place by the weight of the leg.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

IV. GERMAIN COLOT, AND OTHER OLD LITHOTOMISTS.

1460–1706.

GERMAIN COLOT and succeeding members of his family furnished France with its chief lithotomists for the long period of two hundred years. Prior to his day the operation of cutting for stone in the bladder was practiced in that country by itinerant quacks and mountebanks, of whom Italy furnished the greater number. It would appear that ignorant, conceited and mercenary specialists monopolized this important operation from the earliest times of which we possess any information concerning it. Though an operation of so much importance that one would suppose it would have been most carefully studied and included among the legitimate duties of the surgeon, yet we find that while the Asclepiadæ did not hesitate to recommend cutting into the kidney, they excluded cystotomy from the domain of surgical art.

The only mention of lithotomy in the Hippocratic writings is in the "OATH," where it is entirely interdicted, thus: "I swear not to cut any person attacked with stone: I will abandon that practice to the mercenaries who devote themselves to it;" or, as Mr. Adams renders it, "to be done by men who are practitioners of this work." No satisfactory reason is given for this prejudice, so that we are left to infer that it was considered at that time—as it certainly was some centuries later—not respectable. The Arabians held this view of lithotomy, for it is distinctly avowed to be *infra dig.* by Avenzoar, who wrote about the middle of the twelfth century, saying, "It is an operation which no upright and respectable physician would witness, and far less perform."

In the North of Scotland, a little over a century ago, lithotomy was performed by non-professional persons. Mr. Adams states, that when a boy he heard of an old miller, whose name was Cromar, who was very famous for cutting persons for the stone. To this day, in many parts of the East, this operation is still cultivated as a separate branch of surgery. And thus it was in Italy down to the time of Germain Colot, who was a French surgeon of great renown, and in high favor with Louis XI. About the year 1460, having previously ingratiated himself into the good will of the Italian lithotomists, whereby he was allowed to be frequently present, and often permitted to assist in their operations, and having attentively observed all the details of their procedures, Colot declared that it was a shame and a disgrace that an operation of so much importance should have been so long and so entirely neglected by the surgeons of his own country. He accordingly resolved to remove the opprobrium by instituting a series of experiments upon the cadaver, which having done, he promptly communicated the results to the medical faculty of Paris, and the physicians of the Court, from all of whom he received a satisfactory encouragement. Having thus carefully prepared himself, and being confident of his skill , he next made application to the King for permission to operate on a culprit, —one of his Majesty's Archers of Bagnolet—who had been condemned to be hanged for robbery, and was known to have suffered much from stone in the bladder. The petition was granted and the death sentence commuted to this operation, which was publicly executed with enlightened hardihood by Colot, in the churchyard of St. Severins, and in the presence of the King, the operation having been borne with heroic fortitude by the patient, who is said to have recovered in a fortnight, having thus saved his own life and contributed to the salvation of others. Germain Colot made his own name immortal. He received the esteem of the King, who also gave him a liberal pension.

Before proceeding further, it is necessary briefly to allude to the several methods of operating which have been in vogue at different historical periods.

Celsus, who wrote in the first century, gives the earliest account of lithotomy which we possess. It was the simple method, called "cutting on the gripe;" by moderns, "the minor operation," "the apparatus minor," or the *petit appareil*, on account of the small number of instruments required in its performance; and also to distinguish it from the more complex operation requiring many instruments, known as the "apparatus major," or *grand appareil.* Celsus mentions two distinguished lithotomists whose methods he describes, viz.: Ammonius, at Alexandria, in the time of Erasistratus, and Meges, at Rome, during the reign of Augustus.

As an evidence of the judgment and skill of Ammonius, Celsus says, that he practiced breaking the stone in pieces when it was so large that it could not be extracted without tearing the neck of the bladder.

Cutting on the gripe was always practiced down to the time of Joannes de Romanis, a surgeon of Cremona, who flourished in the early part of the sixteenth century.* To this man belongs the glory of having invented the grand apparatus. About the year 1520 he communicated his secret to his "best friend Mariano Santo de Baroletta," who was a Neapolitan professor, by whom, soon after the death of Romanis, it was published (1534) and it was subsequently known to the world as "the Marian operation," though the fact of Romanis being its true author was frankly set forth by his pupil Mariano. The improvement which Romanis and Mariano introduced consisted chiefly in the use of a grooved staff, upon which a median incision was made. I have a copy of the work of Marianus, published in folio at Tiguri in 1555, which is illustrated with figures of handsomely-shaped sounds, grooved staff, dilators, forceps like the most approved modern form, a small scoop, etc. The work is entitled *Libellus aureus de lapide e vesica per incisionem extrahendo.* The preface is dated 1534.

Mariano Santo instructed Octavien de Ville, of Rome, in all the secret arts of the major operation. Octavien having been called to Tresnel, in Champaigne, France, to perform lithotomy, made the acquaintance of Laurent Colot, a physician and surgeon of that place, and having formed a friendly intimacy with him, he instructed Laurent in all the details of the art, and left him, after his death, which occurred within a short time, the sole possessor of the secret of the great apparatus. Laurent Colot became so distinguished that in 1550 Henry II called him to Paris, gave him valuable presents, made him one of his court surgeons, and appointed him lithotomist of the Hôtel Dieu, which office was retained by the family down to the time of François Colot, of whom mention is yet to be made.

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* It is still practiced with great success by the native doctors of Hindostan. In 1827 Dr. Madden, the traveller, saw it performed in Tyre by an old pilot on a boy of thirteen who did well.

Laurent transmitted the secret to his grandson, Philippe, as a precious patrimony; this grandson was born in 1593, and died in 1656. He was the last of three who had inherited the family secret. Philip had a European reputation, and was called to all parts of the continent. He was the father of a third Laurent, who, strange to relate, was afflicted with stone, for which he was operated upon by his own son François. Philip instructed two of his relatives in the art, viz., Severin Pineau and Restitut Gyrault, his own nephew. The former undertook, by order of government, to establish a school of lithotomy, beginning with ten pupils, but utterly failed. Gyrault had two scholars, to whom he gave instructions, one his own son, who, in turn, became the master of François, the grandson of Philip Colot.

M. Vallot tried to purchase the secret of François, who refused all overtures, as he had in mind the more noble purpose of publishing it freely to the whole world.

Thus it came to pass that François Colot was the last member of this distinguished family to whom this specialty descended as a secret. He practiced the art of his ancestors with greater dexterity than any of his predecessors, having much simplified all the procedures. He became renowned, not only in France, but in England, Germany and Italy, to which countries he was frequently called. It is said that he was so much occupied in Paris that he was obliged to refuse the request of Cardinal Chigi, of Cologne, who desired his services in that city. He was the only one of the Colots who possessed the learning and public spirit to write a treatise on the subject, which he did under the following title: *Traité de l'operation de la taille, avec des observations sur la formation de pierre, et le suppression d'urine.* Paris, 12mo,, 1727. It will be observed by the date that it was not published until twenty years after his death. He was not influenced by pecuniary considerations in his practice. With charitable generosity he bestowed his skill to the poor as freely as to the rich, and for a period of eighteen years he performed all the operations for stone at the Hôtel Dieu without any fee or reward. This benefactor died June 25, 1706, leaving an imperishable name and fame.

About the time that Marianus Sanctus published his work, (1534) one Peter Franco, a native of France and resident of Lausanne, invented what was called the "apparatus altus," or the high operation. This method soon passed into disuse; an attempt was made in 1580 to revive it by Francis Rousset, but with only partial success. In 1717–18 James Douglass read a paper at the Royal Society on this mode of operation, and three years after his brother John "performed it with great applause." Wm. Cheselden also practiced this method at St. Thomas' Hospital, and brought it again into vogue by having cured six of every seven upon whom he performed it, while by the old methods at Paris, of an aggregate of eight hundred cases, two in five died.

Interesting as is the history of lithotomy, the limited space which can be spared in the ANNALS, for matters not strictly practical and recent, will not admit of an exhaustive account of all the distinguished persons whose names are associated with it. There is one more character, however, who must not be passed over in silence. About the year 1695, a man, ignorant of anatomy, but possessed of unlimited surgical audacity, named Baulot, or Beaulieu, better known under the name of Friar Jacques, enriched science with a process of cystotomy known as the lateralized method. It was by a slight modification of this plan that the Hollander Ravius Raw, or as sometimes printed, Rau; and the Englishman Cheselden, developed the complete lateral operation. Jacques was born in 1651 and died in 1720. He was at first a simple domestic of Pauloni, a Venetian, soon after became a monk and then began the practice of lithotomy at Bescon in 1695. It is believed that he was once the assistant of a more skilled operator, monks being employed in those days to care for their horses, and hold their patients; hence they often set up as independent operators, and being perfumed with the odors of the stables their success was in correspondence with their merits. Friar James went to Paris in 1697 and was received by influential persons and the canons of Nôtre Dame as the possessor of a new method of extracting vesical calculi. Heister gives a lengthy account, in his surgery, of Fr. Jacques, of which the following is an abstract partly in his own language: "About the year 1697 this person who was an obscure monk or hermit, as some call them, came to Paris, from some of the outposts of France, in a miserable condition, being both destitute of money, victuals, and clothes, but of an open and free temper, his simplicity of mind being judged commendable by some of the French writers." He showed his testimonials of patients whom "he had happily cut and cured by his safe and ready method." He made no secret of his mode and asked no reward except "to repair his instruments, pay for mending his shoes, or the like." He asked to be allowed to exhibit his skill in the hospitals, which was not granted. He soon, however, acquired a great renown, even with the King, "and made most of the Parisians look upon him as a physician sent from heaven for the relief of mankind." "He was always attended by such a crowd of spectators that at last it became necessary to have a guard of soldiers to keep the tumult in order. He was rough and even coarse in his handling of patients and very careless in the after-treatment, saying, 'It is sufficient that I have extracted the stone; God himself will cure the wound.'" His success was accordingly very bad: of sixty whom he cut in Paris twenty-five perished, thirteen were cured, and the remainder had fistulæ, or incontinence of urine. In 1712 he began to use a grooved staff, with greater success. It is said that he had this improved instrument brought to his attention by Fagan and others of Paris, having previously used a plain sound, without a groove, upon which he cut obliquely and from below upward. He also used a tenaculum, the forceps, and a sort of spoon or scoop for the removal of the stone. He died in 1720, at the age of sixty-nine, having operated, it is said, on not less than five thousand different persons. It is stated that he had been known to operate upon sixteen persons in one afternoon. He travelled from one country to another, and performed all his operations gratuitously, accepting only the rewards which were voluntarily presented to him. He spent a long time in Holland, and it was there that Raw, the master of Heister, took the opportunity to witness his methods, which he improved upon and developed into the true "lateral operation," which bore his name for a long period after as "the process of Raw," or the "Ravian method."

Such is a brief outline of the gradual evolution of the science and art of lithotomy, and thus slowly the race of improvement runs on in the cultivation of the useful arts of civilization. Now and then the hare of genius makes spasmodic strides, alternating with naps, while the tedious tortoise of experience crawls leisurely but unceasingly on.

EDITORIAL DEPARTMENT.

COUNTRY DOCTORS.

A long period of time has elapsed since any medical man was known to quote a line from the Eclogues or Georgics of Virgil. In fact, it would seem to be a precept of the materia medica that pastoral themes and professional thrift are incompatibles; and apparently the Aesculapius of to-day dares not even think of the gentle Tityrus, least he should himself become, too, *patulae recubans sub tegmine fagi.* But what if he did? It is the agrophobia, and not the spreading beech, which is baneful to an enthusiastic man. The youthful graduate packs his trunk on the morning after commencement day, and betakes himself reluctantly to the railway-station. He is envious of such of his class-mates as can afford to settle in the metropolis and await the tide of professional fortune. For them, the fates have decreed an opportunity to keep up their studies and build up their reputations; for him, there is no future excepting the rust and dust, the abundant toil and scanty remuneration, the obscurity and desuetude of a country practice. He cannot remain in the city to starve, therefore he must go to the country; but he believes that in so doing he goes into a sterile exile, a Siberia where no good fortune is possible—except, perchance, to make one's escape.

This view of the matter is as mischievous as it is fallacious. It must necessarily work injury to the individual practitioner, to his patients, and to the profession at large. Of course a man who does not expect to study is not likely to study. If the mental pabulum which he can extract from the old wives' lore of the village in which he functionates is all that he demands for himself, it is doubtless all that he will get. But the old wives are not to blame for this. The fault is in the man himself; or in the purpose and expectation with which he enters upon the career that falls to his lot. True, the metropolis affords advantages and opportunities which the village does not furnish; it also imposes hinderances and limitations which are not encountered in the village. The converse is also true. And to the student who has learned the knack of withdrawing into his sanctum, it is comparatively unimportant whether he be surrounded by the bustle of the town or the gossip of the country. The town is critical; the country is fecund; that is all.

The country doctor complains that he is deprived of the stimulus of fellowship; but he is mistaken. The post office will keep him closely *en rapport* with his peers, whatever the intellectual rank to which he may attain. Whittier at Amesbury lives in a community of poets; with Tennyson at breakfast, Longfellow at dinner, and Holmes lending the sparkle of champagne to his tea-table. So will the country doctor enjoy the real fellowship that he earns. He complains that he is cut off from attending upon the great clinics of the metropolis. Yes, but every case that comes before him is a clinic, if he will but turn it to account. He has but to keep up the scientific habit and purpose of life, and all that he does will have the character and productiveness of scientific work.

The wide domain of experimental science is probably as accessible to the country doctor as to his urban confrère. A laboratory can be established anywhere, and it is from the laboratory that modern science expects to obtain her most important data. Edison's laboratory stands in a metropolis of Jersey mud; Virchow built his reputation in a remote townlet; Mayer, of whom Tyndall says, "as seer and generalizer. Mayer, in my opinion stands first," was all his life a country doctor; and no man who can obtain control of a garret or a shanty should permit himself to complain that he lacks a *ποῦ στῶ* from which to move the universe.

Moreover, aids and guides to private study are vastly more abundant and accessible than in the days of Mayer, or the youth of Virchow. To the students of anatomy, the books of Gray and Huxley, a scalpel and the cadaver of an animal, will furnish material for any amount of research. For histology, Rutherford's little book and a microscope will open the way to a life-long career. For experimental therapeutics, what could be more favorable than Ott's monograph, and the plenitude of organic life which is to be found only in the country? If the country doctor would be a chemist, let him start his laboratory, and Morfit's "Manipulations" will tell him all that he lacks; if botany is his choice a microscope and Sach's book will give him an excellent start; or if he cares to join the great army of physiologists, he will find all that he needs in Sanderson's handbook for the physiological laboratory.

But the country doctor complains that he has no time. True enough, perhaps; neither has the city doctor. Only the great workers have time for work.

Some fifty miles from New York city there lives a country doctor whose gig has rattled over the stones and ploughed through the mud of the vicinage for more than a quarter of a century. He still toils day and night at the vocation in which he has grown gray—he will never grow old. He started poor; probably he is not yet rich in worldly pelf. Yet the success of his life is such as would satisfy the reasonable ambition of any man. The visitor knocking at his door will be welcomed by a broad-shouldered, genial scholar, who takes his guest to his heart when he gives him his hand, and opens wide to him the portals of a mansion where simplicity vies with elegance, and all domestic graces flourish in a Christian household. To have developed such a home were success enough for any man. But yonder is another and larger building. It is the fireproof library and laboratory, where this man proves to the world, after a fashion of his own, that a country doctor has no time for scientific pursuits, no stimulus, no fellowship. Here are thousands of rare and priceless volumes, collected, arranged, and mastered by this country doctor. How could he have found the time for all this? But this is not all. Up stairs, in a spacious hall, cabinet after cabinet is filled with collections of shells, of skeletons, of pathological specimens, —thousands and thousands of objects of scientific interest, grouped, studied, and remembered by this country doctor. But this is only the by-play of his life. Year after year, he sits at his desk in the half hours which he can save out of the day's turmoil, and, looking out upon the noblest of rivers and the fairest of scenery, he thinks out the great work of his career. Every year adds a few pages to the book, and each decade shows that he may hope yet to see his masterpiece completed.

THE CLINIC.

FRACTURE OF PELVIS.—RUPTURE OF URETHRA—EXTRAVASATION OF URINE—PERINEAL SECTION. Recovery. CORBIN. Male, aged 55 years; of spare frame and temperate habits; January 14, 1880, was caught between a firmly fixed post and a moving street car, and drawn through the space between the two, which by after measurement was found to be but eight inches. Great immediate shock. On attempting to urinate shortly afterward could pass no water, but suffered intense acute pain in pelvis and increased shock. Catheter could not be passed beyond membranous part of urethra. Perineal section made January 15th by Dr. Job Corbin, assisted by Drs. C. Jewett, J. H. Hunt and B. Ayres. Urethra found torn entirely and squarely across at apex of prostate gland. Connective tissue in front of bladder infiltrated with urine and blood as far upward as to apex of bladder. Distinct crepitus elicited from pelvic wall at some point not accurately determined, soft catheter passed through perineal wound and prostatic urethra into bladder and allowed to remain four days, after which urine passed entirely by the perineal fistula until end of third week, when it began to pass through penis; perineal opening has gradually contracted until but a few drops of urine escape during urination; has good control over bladder. General treatment by stimulants, quinine and opium; locally, lotions of dil. sol. carbolic acid. During third week an extensive superficial slough over right iliac synchondrosis occurred. March 15th, after weeks of most critical illness, has so far recovered as to be able to walk about his house; his general strength is steadily improving; a small superficial ulcer alone remains from the slough.

TRACHEOTOMY—DIPHTHERITIC CROUP.—Recovery. FOWLER. Female, æt. 3½. Pharyngeal diphtheria January 17, 1880. January 21st, laryngeal obstruction marked. January 22d, dyspnœa distressing; temporarily relieved in afternoon by expulsion of membranous cast; extreme dyspnœa again having rapidly developed, tracheotomy was done by Dr. Geo. R. Fowler. During second day after operation sudden asphyxia was threatened: by removal of tube and introduction of curved forceps a large irregular membranous mass was removed and urgent symptoms relieved: ninth day, paralysis of muscles of deglutition developed; eleventh day, tube removed; thirteenth day, albuminuria, followed by total suppression on succeeding day, which lasted for sixty hours, relieved by treatment; gradual convalescence thereafter.

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ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

TRANSFUSION OF BLOOD.*

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TRANSFUSION of blood is one of the oldest operations on record. Like many other operations it has been fashionable for a short time, and then again has dropped into comparative oblivion. Notwithstanding the fact that it is an old operation, it has yet no established basis; that is, there are no fixed rules or indications for its performance so as to make it compulsory on the rank and file of the profession to follow them as they do in other operations. There are several reasons for this: one, that the operation is seldom taught in the medical schools, and in our text-books little is said about it; another, the fact that it is considered a very difficult, as well as a very dangerous operation. Now I have no hesitation in saying from my own personal experience, that the operation is neither dangerous nor difficult; in fact I know of no operation in surgery that is any more simple than the operation for transfusion, unless it be the opening of an abscess. It is a very simple operation, one I believe also that can be performed under all circumstances on moribund patients without hastening the death of the patient. I am certain that with the ordinary care you would exercise in any operation, with careful attention to details, it is free from danger.

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* Delivered before the Society, December 8th, 1879; reported stenographically by Mr. John E. Norcross.

With regard to the antiquity of the operation, although the records are very meagre they are sufficiently full and pointed to make us positively certain that the operation is a very old one. Ovid, in his *Metamorphoses*, speaks of the sorceress Medea, who was in the habit of transfusing old men with blood mixed with some vegetable juices, in order to renew their youth. Of course this only shows that the ancients had some idea of the operation. Coming down to more modern times, we have the case recorded in the life of Savonarola, the celebrated Florentine monk, of the transfusion of Pope Innocent VIII. The Pope was an old man, he had been suffering from some disease which produced coma—I don't know what the disease was; his physician thought he might revive him by transfusion. Two healthy young men were obtained, the Pontiff was bled, and the blood which was taken from his body was injected into the veins of one of the boys. When it had circulated sufficiently for the purposes of the physician, the boy was then bled and the blood transferred to the veins of the Pontiff; the two boys were used up in this way without success; the Pontiff died, and so did the boys.

In 1615 Libavius advocated transfusion from artery to artery by means of connecting silver tubes, but there is no record of his cases. In 1665, Lower, of Oxford, performed the operation on animals with success. He bled them and transfused them, and, according to his record of the matter, saved the lives of the dogs he had bled. Yet later, Denis, of Paris, performed transfusion upon a young man who had been bled and purged for fever, according to the orthodox fashion of those days. He injected ten ounces of lamb's blood into the veins of the man, and saved his life. Shortly after that he tried transfusion in a case of insanity; the patient had been bled for his insanity, and purged for his insanity, without changing the irregular current of his thoughts. Denis injected nine ounces of calf's blood with the effect, it is said, of restoring the patient to perfect health, both mentally and physically. At the end of three months the patient was again taken down with his disordered mentality, and Denis attempted to operate again, but on opening the vein he found there was no blood flowing. He concluded it was not a safe operation to perform at that stage, and left the patient. That night the patient died. The wife of the patient said Denis had killed him, and Denis said the wife had poisoned the patient; at all events, it made such a stir that the operation of transfusion in France was trampled on, and prevented from being performed by a law which made it necessary before transfusion could be done that every one of the faculty should agree on the necessity. Of course that was equivalent to making it an impossibility, because no body of medical men ever yet entirely agreed on any one subject. It was not resuscitated until 1825, by Dr. James Blondel, of London. He investigated the matter thoroughly, and tried it on dogs and on human adults. He bled the animals until they were to all intents and purposes dead; he bled them until the pulse and respiration had ceased completely; he found that he could resuscitate the dogs at the end of three or four minutes. If they were apparently dead more than five minutes, he found the injection was of no use. He kept one dog alive for three weeks without any food, with nothing but the injection of blood. His first five cases of transfusion on the human adult were entire failures—failures, because the operation was performed too late, but afterward he was more successful, and saved several cases who were dying from hemorrhage. He did more to give the operation character than any one person, and it has never gone completely out of fashion since his time.

Within the last ten or fifteen years the operation has been performed a great many times all over the country. It has been performed in Europe to a very great extent, and in this country also, and yet, as I said before, the operation has no settled basis. The mind of the profession has not been made up to its positive efficacy, in certain cases. Dr. John T. Morton, of Philadelphia, gives some very reliable statistics with regard to the success of the operation after post partum hemorrhage. The number of recoveries where the operation was performed was fifty-six per cent.; when the operation was performed for injuries to blood vessels, or for the hemorrhage resulting from them, the recoveries were fifty-eight per cent., giving a very large percentage of recoveries.

We all know that transfusion is indicated positively after loss of blood—that is one indication that there can be no doubt about. I settled it in my own mind by my own experiments. The first case in which I performed the operation was upon a patient in Charity Hospital, who, as the result of severe and repeated epistaxis, was almost *in extremis;* her pulse was almost imperceptible, her respirations were irregular and sighing, she was pallid, her hands and face, as well as the lower extremities, were bathed in a clammy perspiration. All present considered that transfusion was the operation which was indicated. I injected five ounces of blood with the aspirator, and it was not more than half an hour from the time the operation was performed until she rallied in a very remarkable way; her voice returned, her pulse became full and regular, her respiration became natural, she sat up in bed and said she felt all right.

As a precautionary measure her nose was plugged up and left plugged for a week. She ultimately made an excellent recovery. It was the opinion of all who saw her that she would have died, but for the transfusion.

I have had only two other cases in which I performed transfusion in hemorrhage. One was a case of hemorrhage from an incised wound of the throat. I saw the patient three hours after the injury; the surgeons had sewed up the wound in the neck very nicely, and everything looked promising for transfusion. The donor fainted before I had taken more than two ounces of blood from his arm: I injected all the blood I could get, less than two ounces, a very small quantity, though the quantity small as it was showed an evident effect in a few minutes. The man's pulse returned, and he was able to articulate plainly, and I left the house, after giving him some brandy by the rectum, feeling satisfied that the case was progressing favorably. It turned out badly, however; the patient choked to death from hemorrhage into the larynx about an hour after I left. In the primary dressing of the wound, some severed artery had been overlooked, and as soon as the circulation was reëstablished the blood poured from it into the larynx, and the man died.

The third case occured four weeks ago; a patient treated by Drs. Reynolds and Comstock, of New York, for miscarriage had very profuse hemorrhage for two weeks, owing to a small portion of the placenta which remained in the womb. Two days previous to the time I saw her she had been under the constant care of her physicians, who were trying to resuscitate her in every way; they were with her the whole night before I saw her. I was called in at seven in the morning, the patient was pallid, there was not the first sign of pulse in the wrist. A portion of the time she was insensible, but by applying ammonia to her nostrils she was roused sufficiently to whisper, but she was evidently dying, the same cold perspiration covered her hands and face that you will always see in impending death from hemorrhage. I was so much afraid she would die that I did not defibrinate the blood. I used Collin's instrument, made the attachments to the arm and allowed the blood from the donor to flow directly into the receiver of the instrument, and I injected it as it was flowing in. In the course of three or four minutes, seven ounces had been injected. The effect was almost miraculous upon the patient, her pulse came back inside of fifteen minutes, a little more color returned to her lips, and she was able to speak plainly —to articulate without any trouble. From that time she made a rapid recovery, and now she is walking around as well as anyone. There is no doubt in my mind that this patient would have died without the transfusion.

I have in the course of my experiments found another indication for transfusion of blood. In cases of tertiary syphilis or malignant syphilis, where iodide of potassium and tonics fail to do any good, and the patient is sinking, transfusion of blood is one of the best things that can be done. I did not get at this fact until last year I tried it as an experiment without any special faith in its efficacy. I knew it would revive the patient somewhat; that the introduction of a few ounces of healthy blood would be beneficial, but I did not expect the transformation which resulted. The patient was an inmate of Charity Hospital, and had had syphilis for a number of years, and also a cavity in the left lung. They had tried everything: the man was going to die; I suggested the operation, and he consented without any hesitation. The man had several very deep ulcers in his legs, which had been there for a long time; there were also ulcerations between the toes; there were large spots of pigmentation on the back and limbs; besides these, there were many large ecthymatous pustules scattered in different places. I injected between five and six ounces of blood, undefibrinated, mixed with ammonia. On Wednesday, five days after the operation, Dr. Van Buren showed the case to his class. The ulcers within that short period had healed over. They commenced to heal immediately after the operation; some of them were completely covered; the pigmentation spots left the skin before the end of the week. The change was very remarkable; his strength returned, his appetite returned, and he continued improving for two weeks. Then he had a hemorrhage from the lungs, and I transfused him again. I transfused him altogether three times. He remained in the hospital four months after the last operation, with scarcely a sign of syphilis about him, though his phthisis kept him back. The deposit was gradually breaking down in his lung, but the signs of syphilis disappeared for the time being. Of course there is strong likelihood of their coming back: I don't know what became of him: he left the hospital soon afterward very much improved. The syphilis will probably show again, but there is nothing in our materia medica, no method of treating a case of syphilis that would have produced the same results as the transfusion did in this dying case of tertiary syphilis and phthisis. After that I transfused four other syphilitic patients, and all but one, who was dying when I operated, showed remarkable improvement, but not so much as in the first case. They were all in the last stages of phthisis and syphilis. Their ulcers healed, and their eruptions almost entirely disappeared, and that satisfies me that syphilis is one of the diseases which, when medicines fail to affect, should be treated with intra-venous injections of blood. I have no more doubt of that fact than I have of its beneficial influence in hemorrhage.

In phthisis I am in doubt with regard to its efficacy. I have transfused a large number of cases, and in all there has been temporary improvement, but in none have I seen the same beneficial results that I did in syphilis. I do not think it is an operation that should be resorted to in phthisis unless the patient is anxious to try the experiment, or anxious to prolong life for a week or two. I think that can be done: thus transfusion in phthisis will prolong life a short time. I have never tried it in cancer; it has been tried by other surgeons with some success—probably the same amount of success that has attended it in cases of phthisis. It has been used in typhoid fever with the same result—temporary improvement. In all cases of general debility, or the extreme debility that arises from long-continued suppuration, it is beneficial—a little more so than it is in phthisis, not so much as it is in syphilis. Of course it is very natural that it should be so; the introduction of healthy blood into a diseased frame will, for the time being, give more strength, will increase the vitality of the patient more than anything else you could do in such a short period. We have then two positive indications for the transfusion of blood, viz., prostration from incurable syphilis and impending death from hemorrhage. In these two conditions there is no possible doubt of the efficacy of the operation. Further investigation may develop other conditions in which the operation of transfusion is peremptorily called for.

There are many ways of performing the operation. The old method, which prevailed up to within a very short period, was to open the vein of the donor, and take out about seven ounces of blood, whip it with glass rods or with pieces of broom, to take all the fibrine out of it, then strain it, and inject with the ordinary syringe. When I started to operate I made use of Dieulafoy's aspirator, by means of which blood was drawn from a vein in the donor's arm, mixed then with a solution of ammonia previously introduced into the cylinder of the instrument, and then injected into a vein of the patient. With this apparatus I have made thirteen transfusions satisfactorily.

But in all my recent cases I have used this instrument (Fig. 1), which is, I think, the finest in existence, one of the simplest and one of the best. As you see, it consists of a reservoir or basin for the blood, to which is attached a syringe—nothing more than an ordinary syringe—working as any syringe would; to this is attached a tube ending in a canula. The entrance to the tube is guarded by a ball valve which excludes air and permits only a heavy fluid like blood to enter.

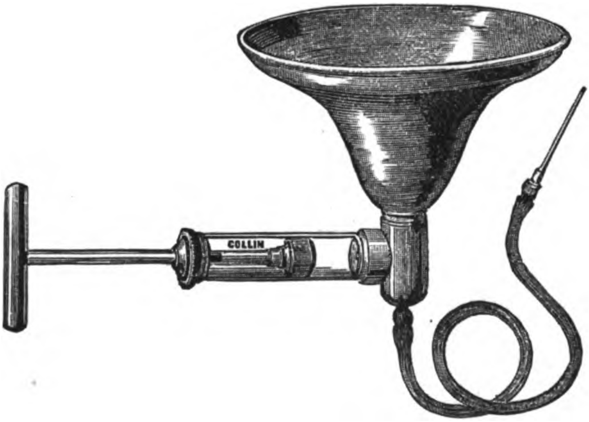

FIG. I.—COLLIN'S INSTRUMENT FOR TRANSFUSION.

This instrument is known as Collin's instrument, invented by an instrument-maker in Paris. The main point about it is that it is impossible for air to enter in any way, even without ordinary precaution. Another interesting point about it is this: the canula already attached to the instrument fits into a smaller one, which should be previously inserted into the vein of the patient. This canula, when inserted into the vein of the patient, contains a probe-pointed stylet. This probe point is better than a trocar; it does not stick in the wall of the vein, and it reaches out beyond the edge of the canula, so that when you have the opening made in the vein you can find it and push in the canula without any trouble, still closed with the stylet. It simplifies that portion of the operation much. When the blood is all ready in this instrument, which is warmed in a basin of water, force some of it out through the tube so as to get the air out; then refilling the syringe from the reservoir, withdraw the probe-pointed stylet from the canula in the patient's arm, the out-flowing blood preventing the air from getting in; the canula of the instrument is then inserted and the injection proceeded with, the whole operation being thus greatly simplified.

There is another instrument here which I have used but once, that is Aveling's (Fig. 2). It consists of a rubber bulb with a rubber tube on each side and silver canulæ. One has a beveled extremity, the other a round extremity. I do not like it. The first time I used it the blood coagulated in the tube of exit; but others have used it with success, and some like it better than any other. With this you have the blood transferred directly from the donor to the patient. The instrument is first placed in a basin of water and the air expelled by squeezing the bulb: as the pressure is taken off the bulb the water flows in and fills it up, the stop-cock in the meantime being opened to allow of that; when the tubes are full I turn the stop-cock of each tube; that retains the water there. Now, the tube with the beveled extremity is inserted into the median basilic or median

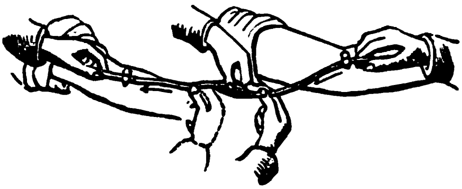

FIG. II.—AVELING'S INSTRUMENT FOR TRANSFUSION.

cephalic vein of the patient; it is a large tube and requires a large vein. The round-ended tube is introduced into the vein of the donor. When the instrument is in position an assistant, or the operator himself, squeezes the tube on the side of the donor, then by pressing on the bulb, forces the water which is in the bulb into the vein of the patient. Then taking the pressure off the tube he draws from the donor into this bulb and goes through the same procedure again, pressing the bulb and forcing the blood which is now in the bulb, instead of water, into the veins of the patient. When he relaxes the bulb he presses the tube on the side of the patient; that is to prevent the blood from being drawn back again, and by alternately compressing and relaxing the bulb, and holding first on one side and then on the other as he is making the movements, blood is gradually forced in. The principal trouble about this instrument is that the movements you make by compressing and relaxing the bulb is like whipping the blood, and you are apt to make a clot in the blood as the result Another thing is, you have to cut a very large hole in the donor's arm to put the large tube in; you are more liable to get up inflammation, and it looks a more formidable operation to the donor than with the other instrument.

The instrument used by Professor Thomas for the injection of milk is simply a funnel with a rubber tube and a canula. The milk, or, if you choose, the blood (I have done it once with blood) is poured into the funnel and allowed to trickle through until all the air is out, and the tube is then inserted in the vein just as the other, and the fluid will gradually go in, milk or blood, whatever you use. Blood being a good deal thicker than milk takes a long time to get in, and should be kept warm by towels dipped in hot water.

The dangers of transfusion are said to be, first, the danger of forcing too much blood on an empty and weakened heart; the heart in the moribund patient being very feeble, sometimes the sounds can scarcely be heard, and a little extra load forced on such a heart will suffice to paralyze it. That is one of the supposed dangers; you can obviate that by making your injection very slowly; if you inject or allow it to pass in small quantities there is no danger of paralyzing the heart; that is one important objection removed. The next one is the formation of clots—injecting clots or forming them after you have made the injection. That you obviate in one of two ways—either by using the aspirator and mixing the blood with ammonia, or, as I prefer, by using Collin's instrument and defibrinating the blood beforehand. By doing this the second objection is removed. The next danger is the entrance of air. They say if air is injected into the veins it is likely to produce death. So it is, if you have a sufficient quantity. I have injected air into the veins, in small quantities it is true, but enough to make a gurgling noise in the veins and to show me that some went in, without interfering with the respiration in any special region. No air can be injected with Collin's instrument however much blood is injected, or however slowly it is done. Thus, then, the third danger, the entrance of air, is obviated by this instrument. From this you can readily see that by attention to the small details the dangers of transfusion become very slight. In operating, I generally select the cephalic vein for injection. In emaciated persons it is very easy to get at; in persons who are fat, it is more difficult. But always you can see a faint blue streak at the bend of the elbow, which is the median cephalic vein, and this is the vein I generally open in fat persons. I choose the cephalic above the elbow in most cases, because it is far away from any important structure and very superficial.

I either pinch up the skin over the vein and make an incision directly over it, or, as I have been in the habit of doing lately, I pull the skin a little to one side, insert a curved bistoury by the side of the vein, and cut it up for about an inch; when I take the pressure off, the integument goes back into its original position and exposes the vein. Instead of doing any more cutting, with director or probe I separate the vein from its attachments in the cellular tissue; having done this and exposed the vein clearly, I make a transverse opening, a valvular opening, right across the vein, lifting it up with the forceps, cutting until I have cut through about two-thirds of the wall of the vein; then I introduce my canula. It is customary with other operators to put two ligatures there, to ligate below the opening so as to prevent the blood from getting out, and to ligate over the canula after you have put it in. I do not do either. I think the less harm you do to the veins and the surrounding tissues the better, and if you can get along without putting ligatures around the vein you have made an improvement in the operation and your patient is better off when you get through. All that is necessary is to have a reliable assistant, who holds the canula in the vein with a gentle pressure. When the arm of the donor is tied above the elbow so as to obstruct the circulation of the vein, I make an incision in the median basilic or cephalic vein half an inch in length. There is an important point to be remembered—if you make a small opening in the vein, the blood will coagulate very soon—will coagulate before you have time to defibrinate it—and this action will destroy your operation. You must make the opening in the donor's vein large, and get a large stream half an inch in width from the vein. The blood is received in a cold vessel, and is beaten either with pieces of broom or with glass rods. I like the glass rods because they are cleaner, and they will soon get the fibrin out. After whipping it for four or five minutes, I strain through a piece of satin, which has been boiled so as to remove all impurities, into a clean dish, as a finger-bowl. When that is through with, I take the glass rods and whip it more. Not satisfied with the first whipping, and not satisfied with the first straining, I whip it again for a couple of minutes; then I take another piece of satin and strain it again. If you do that there is no chance of any fibrin getting into the patient's veins. I thought formerly that taking fibrin from the blood diminished its restorative qualities. Others have decided that question by examining the blood microscopically and finding that the corpuscles were not diminished. Practically I have found very little difference, if any, in the injection of defibrinated blood or undefibrinated blood. The stimulating properties are about as good, and you take away very few blood globules by whipping; the only danger is exposure to bacteria and mixing the blood with some impurities, but I don't think that objection amounts to anything. At all events, I have seen no bad results from it.

When I have made the last straining I place the dish in a basin of hot water, 110° F., and allow it to remain in it for about five minutes. The instrument (Collin's) is also in the water, with all its connections. This part of the operation I generally do first; then I expose the vein. When my tube is in the cephalic vein and closed by its stylet, the instrument being heated, and the blood being heated, the latter is poured into the cylinder. I generally pour in seven or eight ounces. When the blood is in the receptacle I draw the handle of the syringe and fill the cylinder with blood. I then force a little of it through the tube so as to drive out the air. When everything is right I withdraw the stylet, blood follows it, and I introduce the canula, an assistant holding it.

It is also well while this is going on to have some one watch the pulse and respiratory movements, and it is always well as you are injecting to examine the patient yourself. Do not trust to the assistant; watch the countenance of the patient, and his respiratory movements; ask him how he feels, if there is pain in the head, any vertigo, any dimness of vision, any constriction of the chest, any pain in the back; find out all you can as you are going on with the operation. You will generally find with the other methods of operating, with undefibrinated blood, that the patient will complain of dimness of vision, and will have twitchings of the eyeballs from side to side, and generally constriction of the chest, and weight, a feeling of oppression which is only removed when you stop. All the bad symptoms cease when the injection ceases; but with Collin's instrument and with defibrinated blood, I have no bad symptoms; that is the peculiarity of this part of the operation. Using it you will seldom have vertigo, pain in the head or nystagmus—indeed few bad feelings whatever. This instrument was by its inventor used for blood undefibrinated, as I used it three weeks ago, pouring the blood directly into the patient's arm undefibrinated, and it is used in that way in Paris now. The cylinder holds half an ounce, and the injection is made very slowly, without any jerks, and there is no danger of overpowering the heart. You draw the piston out and repeat the operation, going on slowly and examining the patient at intervals until you get through. I do not think there is any objection to using undefibrinated blood in this instrument. I am only giving what I consider to be a safe operation in every particular, and one that any practitioner can undertake. There is no objection to using undefibrinated blood if you get it from a healthy man and have your instrument already warmed, not too warm, because if the instrument is too hot the blood will coagulate quicker than in the cold vessel; but under ordinary circumstances, where you are afraid of doing harm, it is best to defibrinate it. A piece of lint and a bandage is all that is necessary for the wound in the arm when the operation is over. I have never seen any inflammation after opening a vein in the patient's or donor's arm. I think you can handle veins with a great deal of impunity, and I have bled men five or six times from one vein in different operations at the hospital, at different periods, without the slightest inflammation occurring.

Society Reports.

STATED MEETING, FEBRUARY 16, 1880.

NOTE ON TRANSFUSION OF BLOOD AS PRACTISED BY RICHARD LOWER IN THE SEVENTEENTH CENTURY.

E. H. BARTLEY, M.D.

Dr. E. H. Bartley presented a copy of the treatise of Lower, on the heart and blood—*Tractatus de Corde, item Motu, Colore et Transfusione Sanguinis, et de Venæ Sectione: Editio Quinta, Leyden,* 1708, together with a translation of the chapter thereof treating upon transfusion of blood. This he had prepared at the request of the President, as a contribution that might be of interest to the subject of transfusion, recently brought strongly to the attention of the Society by the lecture of Prof. Howe.

In this chapter, written in 1668, Lower states that as the result of a series of experiments in the introduction of various nutritive and medicinal liquids directly into the blood, he conceived the idea that it might be both desirable and practicable to transfer the unchanged blood directly from one living animal into another. His experiments he describes as follows, as having been made at Oxford, in February, 1665, in the presence of many:

> Having provided some dogs and other necessary things and having selected one of them of medium size, and opened its jugular vein I drew blood from it, until by its moaning and struggling

it was very evident that its vital powers were failing, and spasms were beginning; then having tied to its side a large dog and made the connections, I introduced as much blood from the cervical artery of this dog as the other had lost, or until it became evident, by its fresh uneasiness that it was overfilling and becoming oppressed by the great abundance of blood.

Then, having tied the supplying artery, we drew blood again from the receiving dog, and repeated this process until the blood of two large dogs had been exhausted, from both of whom the smaller had received blood, nor could life longer survive in them.

Meanwhile, notwithstanding the smaller one had lost and received so much blood by these alternate processes, a quantity which I believe would equal the weight of the whole body yet, when its jugular vein had been stitched up, and the bands by which it had been held down had been loosened, it immediately jumped down from the table, and as if he had forgotten his injury, soon allowed his master to caress him. After he had cleaned himself from blood, he rolled himself upon the grass, and seemed in no way more displeased or disturbed by our discovery, than if he had been thrown in a stream of water.

A report of these experiments was made shortly afterward to the Royal Society, and published in the Philosophical Transactions for December, 1666.

Then the fame of it spread to foreign countries; and in France, where they were attracted by the novelty of the thing, they began to carefully investigate and add to it new experiments, and to do with men what I had done only in lower animals, as appears in their descriptions of it first published in the following March, 1667.

In a letter to Robert Boyle of London, dated Oxford, July 6, 1666, Lower describes minutely his method of procedure in performing transfusion upon dogs, concluding as follows:

As to the minor difficulties of transfusion such as injury or obstruction of the vessels, or more especially when the animals throw and twist themselves about in various ways, I would add, that this latter difficulty may be overcome if the two small inserted tubes are joined together by the cervical artery taken from a horse or ox, which conducts the blood from the supplying tube to the receiving tube. In this intermediate artery we have the additional advantage, that it is flexible, and yields to the varied struggling movements of the animals, and that in case the blood tends to stagnate in it, you can propel and urge it forward at will; or, if necessary, check it entirely.

All the apparatus for this experiment and for performing this operation are illustrated by the following figures, which, says Lower, show them so clearly, that anything more concerning them would be superfluous.

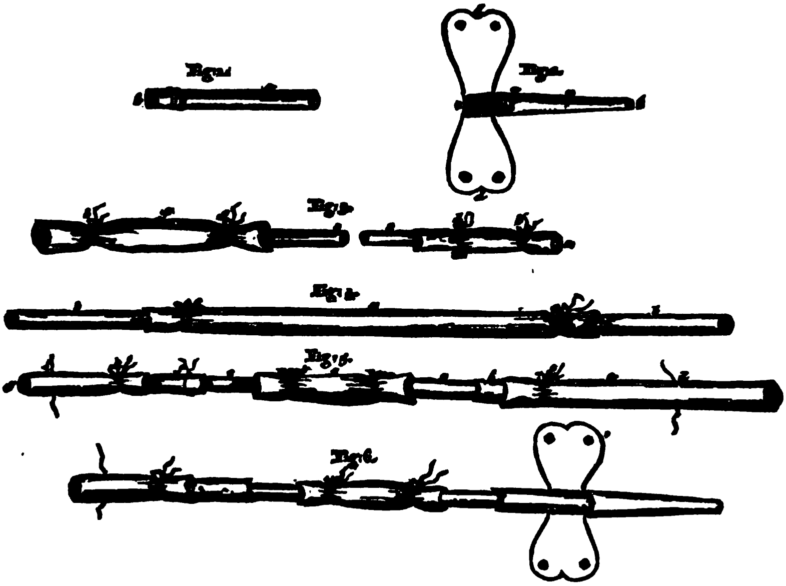

Photo-engraved reproduction of TABULA VII, *Lower, Tract de Corde, etc.*

FIG. 1.—*a*, silver tube; *b*, part to be introduced into bloodvessel, is encircled by two slightly elevated rings by which a ligature is made more secure.

FIG. 2.—SILVER TUBE FOR USE IN MAN. *a a*, the tube; *b*, smaller end for introduction into a vein of the arm; *c*, larger end for the reception of the blood; *d d*, two wings, perforated on each side to admit a tape for binding it to the arm; *e*, a groove made to receive the incoming tube, and to compress the underlying vein.

FIG. 3.—TUBES INSERTED INTO THE EMITTING ARTERY AND THE RECEIVING VEIN, JOINED TOGETHER BEFORE THE TRANSFUSION BEGINS. *a*, the

artery; *b*, slipknots for tying the artery; *c*, tube for conducting the blood from the artery; *d*, place where the artery is tightly tied upon the tube between the rings; *e*, tube for receiving the blood and transmitting it into the jugular vein; *f*, jugular vein; *g*, place where the vein is tightly tied upon the tube: *h*, second ligature upon vein tied with a slipknot,

FIG. 4.—FLEXIBLE TUBE CONNECTING THE SILVER TUBES MADE FROM THE CERVICAL ARTERY OF A HORSE OR OX. *a*, cervical artery; *b b*, silver tubes.

FIG. 5.—COMPLETE APPARATUS FOR TRANSFUSION OF BLOOD IN ANIMALS. *a*, jugular vein; *b*, silver tube inserted into vein; *c*, vein tightly ligated on tube; *d i*, ligatures to be applied to vessels beyond the tubes; *e e e*, tubes and cervical artery between (flexible tube) to carry the blood from the artery to the vein; *f*, silver tube receiving the blood from the artery; *g*, artery of the animal supplying the blood; *h*, artery ligated by a slipknot.

FIG. 6.—SAME APPARATUS ADAPTED FOR TRANSFUSION IN MAN. Its use is apparent at a glance.

THE SURGICAL TREATMENT OF FACIAL NEURALGIA.

SECOND ARTICLE.*

GEORGE R. FOWLER, M.D.

FRONTAL NEURALGIA.—In this variety the pain is centered at or near the upper orbital margin, thence radiating to the eyelid and inner canthus of the eye upon the afflicted side. The ophthalmic branches are sometimes implicated. The pain may also be referred to one-half of the nose in some cases. The appearance of a patient suffering from an attack of frontal neuralgia is quite characteristic. In addition to the agonized expression of countenance commonly seen in all facial neuralgias, one observes a ptosis more or less marked, an increased pulsation of the temporal arteries, a copious flow of scalding tears and congestion of its conjunctival membrane. A peculiar dryness of the Schneiderian mucous membrane upon the affected side is frequently complained of.

The nerve may be divided subcutaneously at its point of exit at the supra-orbital foramen; this can be readily done when a simple notch marks the point of exit of the nerve. When the foramen or notch cannot be felt, mark upon the integument a spot at the junction of the inner with the middle third of the supra-orbital arch; this will mark about the site of the foramen. Enter the point of a narrow bladed straight bistoury, about a quarter of an inch to the inner side of the point previously marked; pass the knife directly down to the bone, turn it flatwise, and direct its point and edge in such a manner that it will pass beyond and above the foramen. With a sweeping and sawing motion carry the blade downward and across the foramen, closely hugging the bone.

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* Read before the Society, January 19, 1880.

Resection of a portion of the trunk of the nerve is best performed by Lienhart's method as follows: First perform subcutaneous neurotomy as above described. Then make an incision along the upper margin of the orbit and in a direction parallel to the same directly down to the bone. The tarsal cartilage is now separated upon a director and the whole contents of the orbit held away from its roof by a spatula in the hands of an assistant. The frontal or supra-orbital nerve accompanied by the artery, will be found running close to the periosteum and lying above the Levator Palpebræ, which muscle is likewise kept separated from the roof of the orbit by the spatula. The nerve may now be isolated from the artery and surrounding parts, and its trunk severed as far back as possible. The isolated peripheral extremity of the nerve is then to be drawn out of the orbit, and the spatula removed. The hard fibrous bridge binding down the nerve as it approaches the supra-orbital ridge is to be cut through with a pair of strong scissors, or bone-cutting forceps. Having reached the supra-orbital foramen, the further steps of the operation may be facilitated by making a vertical incision at right angles to the first, turning back the corner of the flap thus formed; the branches of the nerve distributed to the forehead may now be dissected up and removed. The cicatrix resulting from the horizontal incision will be hidden by the eyebrows.

SUPERIOR MAXILLARY NERVE.—This nerve may be divided subcutaneously upon the face or within the canal. The division of the nerve upon the face is an exceedingly simple operation. It is done by entering the point of a bistoury about an inch to the outer side of the infra-orbital foramen, carrying the blade close to the bone downward to the canine fossa, and then sweeping it upward so as to cut directly across the mouth of the foramen. The parts may be steadied by an assistant grasping the upper lip and holding it firmly, while the section is being made.

Sub-cutaneous division of the nerve in the infra-orbital canal may best be performed after the manner proposed by Malgaigne. The following points should be borne in mind when this method is chosen. The infra-orbital or spheno-maxillary fissure runs between the sharp edge of the superior-maxillary bone and the orbital surface of the great wing of the sphenoid, in a direction from within outward and forward, terminating within six or seven lines of the infra-orbital margin. At its junction with the frontal process of the malar bone, it occupies a portion of the outer wall of the orbit. The infra-orbital nerve leaving the spheno-maxillary fissure enters the posterior opening of the infra-orbital canal about eleven lines from the orbital margin of the malar bone. It traverses this canal in a direction from behind forward to the infra-orbital foramen from which it projects.

In order to make section of the nerve as it leaves the spheno-maxillary fissure to enter the infra-orbital canal, proceed as follows. Enter the point of a stout, straight bistoury a little within the junction of the inferior with the external margin of the orbit; pass the knife flatwise along the floor of the orbit in a direction backward and slightly inward to the depth of about ten lines; turn the edge toward the bone and cut directly downward through the nerve and its bony encasement. Owing to a great variation in the shape of the orbit failure to completely divide the nerve at the first attempt occasionally occurs.

To convert this operation into a neurectomy make a curved incision along the inferior margin of the orbit, with its middle about four lines below the same. Dissect up the flap, thus exposing the infra-orbital foramen; sieze the nerve and draw it out of the canal.

The excision of the infra-orbital nerve after the manner of Schuh is of comparatively easy performance, the relative wounding of the parts is slight and the immediate purpose of the operation is attained with certainty. His method is as follows. An incision is made along the whole length of the inferior margin of the orbit down to the bone. The eyelid, held by an assistant, is separated from the cheek and drawn upward by a retractor. The operation divides the tarsal cartilage and separates it upon a director the whole length of the cutaneous wound. By the proper observance of this rule the attachment of the inferior oblique muscle remains intact. The whole contents of the orbit being held upward, in a good light the nerve can be recognized beneath the periosteum as a strongly marked grayish white stripe. A strong tenotome is now carried as far posteriorly as possible alongside of the nerve and thrust through the floor of the orbit into the antrum of Highmore. Its edge is now to be turned toward the nerve and by a sawing motion the blade is made to traverse the infra-orbital canal and its contents. The infra-orbital artery will be wounded at this point of the operation, but this is of little consequence as the replacing of the contents of the orbit usually arrests the hemorrhage at once. The infra-orbital nerve is now to be dissected up and isolated at its point of exit from the infra-orbital foramen and the peripheral extremity drawn from the canal. Should it not have been divided well back in the canal the nerve will present itself as several strands. Finally, it is desirable to dissect out as far as practicable the first few branches of the nerve as it divides after leaving the foramen.

In neuralgia of the nerve the best results are obtained by the operation originally proposed and carried out by Prof. J. M. Carnochan of New York. This operation aims to extirpate the whole of the superior maxillary nerve after it leaves the foramen rotundum, together with Meckel's ganglion. The latter is considered by Carnochan as essentially the key to the operation. He made extensive external incisions so as to lay bare the whole of the anterior surface of the superior maxillary bone; these are now considered unnecessary. The incision should begin at the inner angle of the eye on a level with the infra-orbital ridge, extending downward about three-quarters of an inch, then running outward and upward, terminating at a point opposite the outer angle of the eye. This forms a small semicircular flap, which, when dissected from the bone and turned upward, exposes the anterior wall of the antrum and the infra-orbital foramen. The leash of nerves formed by the division of the superior maxillary nerve after leaving the infra-orbital foramen is now to be dissected from the under surface of the flap. A trephine with a crown five-eighths of an inch in diameter is next to be applied to the bone, with its edge slightly overlying the foramen and its point on a line perpendicular to the same. A few turns of the instrument causes it to perforate the wall of the antrum, and upon removing the button of bone the cavity of the latter is brought into view. If during the operation the patient is seated upon a chair with his back to a window, a reflecting mirrror upon the operator's forehead will light up the deeper parts involved in the subsequent steps of the operation.

The nerve is exposed by breaking down the floor of the orbit with a small, three cornered bone-chisel. The nerve is to be followed along the infra-orbital canal until the posterior wall of the antrum is reached. This is to be perforated by a one-half inch trephine, when Meckel's ganglion, lying in the spheno-maxillary fossa, will be brought into view. The trephine, in perforating the posterior wall of the antrum, necessarily wounds that portion of the internal maxillary artery contained in the spheno-maxillary fossa, and some hemorrhage may be expected at this point. By patiently waiting and sponging, however, the difficulty is soon overcome. Should the bleeding prove obstinate, small pieces of compressed sponge may be crowded into the fossa. The bleeding being controlled, Meckel's ganglion is to be broken up and removed; the orbital, spheno-palatine and posterior dental branches are divided, and the nerve cut by a pair of small curved scissors at its point of exit from the cranium through the foramen rotundum. The nerve will now be found completely isolated, and may be easily removed.

NEURALGIA OF THE INFERIOR DENTAL NERVE.—Formerly the only operation performed for the relief of neuralgia of this nerve consisted of division of the different branches of the nerve after it emerged from the foramen.

John Mason Warren, of Boston, was one of the earliest pioneers in the operative treatment of neuralgia of this branch. His plan was to trephine the inferior dental canal in one or more places, and remove as much of the nerve as possible through the openings thus made.

J. Kühn was the first to attempt to reach the nerve in its position posterior to the inferior maxillary bone, and before it enters the inferior dental canal. His object was to create the space necessary for operating by removing a triangular shaped portion of the angle of the jaw. His operation, as modified by von Bruns, is as follows: A curvilinear incision is made commencing at the interspace between the lobe of the ear and the posterior margin of the ramus of the jaw. This incision is carried around the angle of the jaw and anteriorly to the point where the facial artery crosses the bone at the anterior inferior angle of the masseter muscle. The parotid gland is carefully exposed, and the dissection carried sufficiently far to divide its anterior surface. The gland is to be carefully detached and turned back upon itself, and held there by an assistant during the remainder of the operation. The small branches of the facial or seventh nerve, which pass out from under the anterior inferior surface of the gland, are necessarily divided to a greater or less extent. The resulting paralysis of some of the muscles of expression of the affected side is unavoidable, but not always permanent; this latter statement being particularly true of the orbicular muscles.

Beginning at the angle of the jaw, the tissues underlying and situated posterior to the same are to be separated from the bone to an extent necessary to allow the free working of a small metacarpal saw. The bone being cleared the saw is applied to the ramus of the jaw just above the angle, and the bone severed in about one-half of its width. The saw is now to be applied to the body of the bone just in front of the angle, and by sawing directly upward a rhombic piece of bone is excised, a few touches of the knife serving to free it from the attached fibres of the internal pterygoid muscle. After the removal of the piece of bone, the nerve will be found in the angle formed by the junction of the two cut surfaces of bone, just where it enters the inferior dental canal; it can easily be separated at this point from the neighboring parts, to which it is but loosely attached, and its trunk exsected to the extent desired. The inferior dental artery is likely to be divided in this operation; ligating it will at once arrest the hemorrhage.

There have been devised some very ingenious and bold operations for the relief of other neuralgias in the region of the third branch of the trigeminus, but the mutilation of the parts is so great, and the difficulties in the way of reaching the nerve beyond the point reached by Kühn's operation so many, that surgeons have very generally abandoned them.

Simple division of the nerve may be made at a point just previous to its entrance into the inferior dental canal, without external incision, as follows: Sufficient room being obtained by widely opening the mouth and having the cheek retracted by an assistant, an incision is made from the last upper molar obliquely outward and downward along the anterior border of the coronoid process and ramus of the jaw. After dividing a few of the anterior fibres of the internal pterygoid muscle, the surgeon with his finger tears through the connective tissue and feels for the bony prominence which marks the orifice of the inferior dental canal; this being found a blunt hook is passed to the bottom of the incision, and, using the finger as a guide, the hook is swept around the nerve, isolating if possible the artery. A pair of scissors, or probe-pointed bistoury, is passed along the hook and the nerve divided. Should the inferior dental artery be wounded (and it is almost impossible to avoid this accident), troublesome and even almost uncontrollable hemorrhage may ensue.

This operation, although much more simple in its execution than the preceding, is far less satisfactory in its results, inasmuch as the nerve is very likely to become reunited in a comparatively short space of time.

RESECTION OF THE GUSTATORY NERVE.—In a case of persistent and aggravated neuralgia of the tongue, Roser excised a portion of the gustatory or lingual nerve as follows: An incision was begun at the angle of the mouth, and carried directly backward through the cheek to the anterior margin of the ramus of the inferior maxillary bone. The tongue was then seized with a pair of hooked forceps, drawn to the opposite side and there held by an assistant. He then made an incision along the side of the tongue through the mucous membrane, exposed the nerve and resected a portion of it.

With the tongue drawn out in this position the tissues are put very much upon the stretch, consequently as large a piece of the nerve should be resected as possible, in order that when the tongue regains its normal position the divided ends of the nerve may not be brought into contact by a retraction of the tissues.

In conclusion let me state that I do not consider neurotomy or neurectomy panaceas for all cases of neuralgia; but the fact must remain undisputed that much relief, with comparatively little danger to life, may be afforded by these operations. In proof of this witness with what readiness patients have submitted to operation many times, and have even urged the surgeon on to the performance of still more dangerous and extensive dissections, such as resection of the entire superior maxillary bone, etc., as performed by Roser.

A CASE OF CARCINOMA OF THE RECTUM—OPERATION BY EXCISION—RECOVERY.

JOHN BYRNE, M.D.

Exsection of more or less of the rectal intestine for the removal of cancerous formation is, admittedly, a most hazardous surgical procedure, and at best one resorted to under certain pressing conditions only, and with the hope of obtaining for the unhappy victims of these maladies some temporary respite from suffering. The statistics of these, as of many other perilous operations, are as valueless as they are incomplete and meagre, and can afford no very reliable basis of estimate as to the dangers to be apprehended from hemorrhage, peritonitis, or septicemia, or how far we may be justified in expecting from such radical measures a degree of relief at all commensurate with the risk.

By many of the highest surgical authorities, operative interference in cancer of the rectum is barely countenanced, while not a few look upon all such operations as useless, if not unjustifiable; hence, in the majority of cases met with, whether in hospital or private practice, palliative measures alone, as by opiates and the like, usually constitute the entire treatment. In advanced stages of the disease only, and when fatal obstruction threatens, is the comparatively simple operation of colotomy, with its disgusting consequences suggested or undertaken as a *dernier ressort.*

For my own part, and from a careful consideration of the subject, I am of the opinion that such operations should not, as a general rule, be resorted to unless when the disease is circumscribed, of limited extent, and situated low down in the intestine, yet above and clear of the sphincter. Moreover in the female subject, should the anterior rectal wall be involved, no possible benefit could be hoped for from excision, nor would any such interference be justifiable.

It is true if such experience as that of Prof. Nüssbaum, of Munich, were made the sole basis of judging, rectotomy might seem entitled to a wider field than is here conceded, but if the positive risks and difficulties, and an equivalent necessarily problematical be duly considered, and a very moderate allowance made for unheralded disasters, the limit suggested would, in all probability, satisfy every demand of conservative surgery.

Apropos of these reflections, the following may prove of more than ordinary interest:

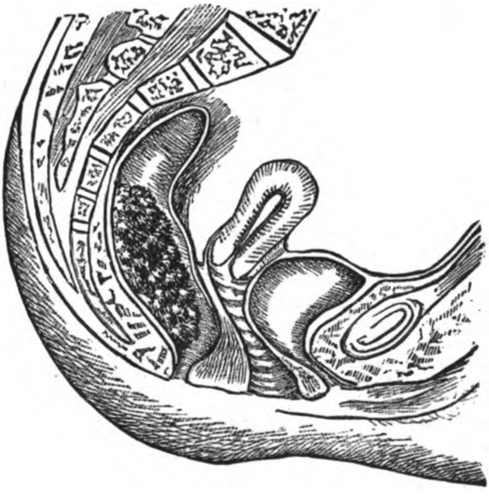
Mrs. T., aged 35, born in Canada, has been married 14 years and has had four children, the youngest two years. She says she has always enjoyed good health up to the fourth month of her last pregnancy, about which period, her bowels being then and for some time previously in a constipated state, she was taken with hemorrhage from the rectum, accompanied with "bearing down" pains like those of labor. Several attacks of a similar nature occurred during the following months of gestation, yet her confinement, at full term, passed over without any remarkable difficulty. Within a few days, however, she began to suffer much from constant lumbo-sacral pains, rectal tenesmus and obstinate constipation, while hemorrhage and excruciating agony attended every effort to evacuate the bowels.

For a year past, but particularly during the last four months, her condition has been getting steadily worse; no fæcal discharges take place except from strong cathartics, and enemata have no other effect than to increase her suffering and provoke hemorrhage. In addition to all this she has had menorrhagia for the past six months. Up to quite recently she says she has been under homœopathic treatment "*for the cure of her symptoms,*" but without relief, and in entire ignorance of the true nature of her ailment.

A few weeks ago she consulted Dr. Randolph, of this city, who at once diagnosed her case as one of cancer of the rectum, and advised her to apply for admission to St. Mary's hospital.

On examination a large cancerous mass of epitheliomatous character was found attached to the posterior wall of the rectum, which it entirely filled up and completely obstructed, commencing at a point about one inch from the verge of the anus and extending up the intestine as far as the finger could reach. Much pain attended this examination, and considerable hemorrhage followed. The uterus was found to be healthy. An operation was proposed, and, being acquiesced in by the members of the Hospital staff, she readily consented.

January 31, 1880.—The patient having been anæsthetized by ether, the perineum and recto-vaginal septum, as far as Douglass' cul-de-sac, were slit up by means of a blunt-pointed scissors, guided by two fingers of the left hand. Hemorrhage to an alarming and almost fatal extent followed this first step in the operation, but hypodermic injections of brandy served to restore the feeble heart's action. The diseased part being now fully exposed was grasped by a vulsellum, and dissection by scissors commenced from below upward, but avoiding the sphincter, which was not involved. The lower third of the mass was movable, so that no great difficulty was found in drawing it forward and separating the intestine from its loose connections, but the upper and larger portion of the tumor involved the subjacent tissues, and, being firmly adherent to the sacrum, much difficulty was experienced in dissecting it out piecemeal. On examining the cavity a small glandular but not indurated body, the size of a hazel nut, was noticed in the upper left side of the pelvis, but as it was very deeply imbedded, and in dangerous proximity to large branches of the internal iliac artery, it was not deemed wise to attempt its



CARCINOMA OF THE RECTUM.

exsection. Besides, the operation thus far was one of the bloodiest I had ever witnessed, and the patient seemed to be already *in articulo mortis.* The cavity was sponged out with a mixture of equal parts of acetic acid and glycerine, to which ten per cent. of carbolic acid had been added. The recto-vaginal wall and perineum were now stitched by interrupted sutures of carbolized silk, a vulcanite drainage-tube, of hour-glass shape at its rectal end so as to insure its retention, was inserted before tightening the last two perineal stitches, and the patient put to bed, but in an apparently moribund condition. Finally, to the free extremity of the tube a few feet of ½ inch rubber hose was attached, and its distal end immersed in a vessel of water for the reception of fœcal and other discharges.

By the application of warmth to the extremities and stimulants, reaction was gradually brought about, and at the expiration of an hour, one and a half grs. of opium was administered by the mouth.

The following is an abstract of the record by Dr. Lubey, the resident physician:—

February 1st, 9 A.M.—The patient has spent a comfortable night, having slept several hours, and is free from pain. Pulse, 116; temperature, 100.

7 P.M.—Has had a slight chill. Complains of pain in rectum. Pulse, 120; temperature 100. Ordered gr. iss of opium, and the rectum to be washed out with tepid carbolized water (two per cent).

10 P.M.—Much more comfortable, and free from pain. Pulse, 110; temperature, 101.

February 2d, 10 A.M.—Pulse, 112; temperature, 101. No pain.

February 2d, 8 P.M.—Pulse, 120; temperature, 101½. Repeat injection by first washing out the cavity with carbolized water, and subsequently allowing one pint of the fluid to remain in contact with the parts for several minutes before draining off. Five grs. of quinine, and repeat the same night and morning.

February 3d, 10 A.M.—Pulse, 110; temperature, 100½. No pain.

February 3d, 8 P.M.—Pulse, 116; temperature, 101. Repeat carbolized douche.

February 4, 10 A.M.—Pulse, 112, and fuller, temperature, 100. Quite comfortable.

February 6th.—The vagina and perineum examined by Dr. Byrne, and union found to be apparently perfect all along the line of incision. Sutures to remain in for twenty-four hours longer, and in the meantime to have a dose of castor oil, no fæcal discharge having passed since day before operation.

February 7th.—Castor oil, followed by copious discharges of fæcal matter mixed with pus, but the vulcanite plug was forced out by the first movement, and the ano-perineal stitch torn away. Removed the sutures, and found union complete except at the outer sphincter. She says she had control over the last two evacuations, and but little pain.

February 11th.—No fæcal discharges from bowels for two days past. No pain, but thinks she would feel more comfortable if the bowels were moved. Ordered ol. ricini ℥ ss.

10 P.M.—Bowels freely moved without much pain.

13th and 14th.—Bowels moved without medicine, and little or no pain; fæces of large calibre, and fair control over the sphincter. She expresses herself as feeling quite well; takes plenty of nourishment, and sleeps each entire night through. A digital exploration of the rectum was made by Dr. Byrne and other members of the Hospital staff, and nothing very abnormal observed.

February 21st.—Has been up and exercising every day for the past week, and has fair control over the sphincter except when the contents of the bowels are in a liquid state; laceration at anus granulating. She gains strength rapidly; her expression and general appearance remarkably changed for the better. Having a great desire to return to her family, she was discharged.

March 14th.—She returned, in accordance with instructions, for examination. Looks to be in excellent condition, and says she feels perfectly well, but would like to have a little more control over the contents of the rectum. Exploration by finger reveals nothing abnormal, and causes little or no pain or hemorrhage.

CASE OF A RARE VARIETY OF HUMAN DIPROSOPIC MONSTER, WITH OBSERVATIONS ON THE GENUS DIPROSOPUS.

GEORGE JACKSON FISHER, M. D.

Before proceeding to a description of the case, now first published, I will call attention to a few general considerations relating to the very interesting genus of monstrosities to which this belongs, and known to teratologists as *Diprosopus*, or double-faced.

The body in this genus is apparently single and normal. The duplicity is chiefly limited to the head, and rarely involves even the neck. The genus ranges from a series of cases in which two nearly complete heads are conjoined by their posterior and proximal lateral surfaces, the resulting compound head having two entire faces, through an intermediate and transitional series, to a class of cases in which the individuals are apparently single, and only determined not to be such by slight but positive traces of duplicity existing in some portion of the axis of fusion, by which it is manifest that the component bilateral halves were not developed from a single primitive embryonic trace. In such a series of cases of diprosopic monsters, ranging from the highest to the lowest recognized forms, the approach to singleness is so gradual, and, finally, so nearly complete, as to suggest the idea of the existence of a being whose bilateral halves may have been derived from two primitive cicatriculæ, developed on a single vitelline membrane, which, in consequence of their close proximity and perfect parallelism, were fused on a common median axis, so symmetrically as to result in a single body.

In my monograph on *Diploteratology* (Trans. of the Med. Soc. of the State of N. Y., 1867, p. 426), case 147 illustrates the above remarks. It is the case of a lamb, which was apparently single and normal. It was found to have a double tongue, and an approach to a double lower jaw, and a cleft palate. No duplicity of the cerebro-spinal axis was discoverable externally; on dissection, however, there was found a commencing double condition of the bones at the base of the skull, an additional set of corpora quadrigemina, double pineal gland, pituitary body, etc. But for this dissection it might have been described as merely an example of double tongue and jaw.

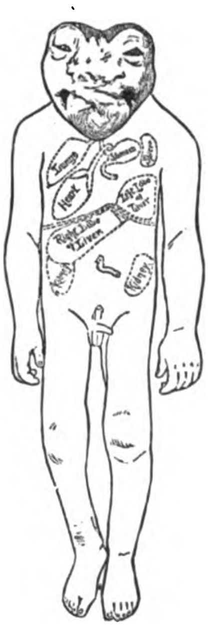
Several sub-genera or specific groups have been made by teratologists to aid in the description of all the varieties of diprosopus. These are based on the extent of fusion and the presence of certain organs; for example, with four ears, three ears, four eyes, three eyes, and two eyes; the corresponding scientific names being, I, Diprosopus tetrotus; II, D. triotus; III, D. tetrophthalmus; IV, D. triopthalmus; V, D. diöpthalmus.

The genus includes some of the rarest forms of duplex development which are known to have occurred in man. The forms with completely separate faces are more common among the domestic animals, the partial separation of the faces are most common in calves and cats, less in man and among sheep, still more rare in swine, goats and horses, and has never been observed in dogs. The diprosopic monster has been found to occur in several species of birds, fish and snakes, and has been seen even in the tapeworm.

Of five hundred cases of human double monsters, noted by Förster, only twenty-nine belonging to the genus diprosopus were found—a fraction less than six per cent. Of this number six were males and sixteen females; the sex of the remaining seven was not stated. I have examined five additional cases in the human subject which have never been reported, three of which were females and two males. A large proportion of the diprosopi are without cranial bones, with the brain correspondingly defective, to which arrests of development their non-viability is to be chiefly attributed. Viable cases are said to have occurred; for example, a child was exhibited in the year 1775, in Spain, which belonged to this genus. It was seven months old, in good health, and having a fair prospect of living for an indefinite period (Regnault).

The following case of *Diprosopus diopthalmus*—two-eyed double-faced—is extremely interesting, as it is the first ex ample of this very rare form ever reported in the entire English and American literature of teratology; indeed, I am not aware that a similar case has ever been reported in any country. The case occurred in my own practice, February 3d, 1878. Mother aged twenty, a primipara, end of sixth month of gestation, labor natural and easy, no cause known for premature confinement, fœtus dead.

External configuration.—Male, body and extremities well formed, cranium and brain wanting, face broad, chin very large; eyes widely separated by what at first sight appeared to be a single broad flat nose, having two anterior nares very far apart. Two triangular openings, one on each cheek, are separated more than an inch by the broad chin, in the centre of which two small dimples are seen. Spina bifida involving four or five vertebræ, lower dorsal and upper lumbar.



The fœtus was laid aside for about two weeks in a cool place, during which time it became somewhat shrunken, when it was discovered that the broad flat nose, which had been taken for a single one, was in reality two noses, almost parallel, the outer nares being pervious, the inner or proximal ones imperforate. The fact of two nares, of course, furnished the key to the duplex character of the monster.

Internal structure.—The two triangular openings were found to be distorted mouths, which opened into one common oral cavity containing two tongues converging at an angle of eighty degrees, and united by their posterior thirds. A single epiglottis, and single larynx, trachea, and œsophagus. The superior maxillæ apparently single, the palate abnormally broad. Nasal cavities not examined; the nares on each side of the axis of fusion of the double head, as above mentioned, are imperforate, but are indicated by small depressions. Two inferior maxillæ, the inner rami are united but not fused, condyles not developed. The diaphragm normal on the right side, but absent on the left, except a narrow strip or band corresponding with its anterior border. Through this great opening the enlarged spleen, the abnormally large left lobe of the liver, the stomach, and a part of the small intestines had passed into the left side of the thorax, the heart and left lung being crowded over into the right side of the chest. This diaphragmatic hernia had probably existed during the whole period of fœtal life, as a result of arrested development of this partition. The small intestines measured ninety-nine inches, the large twenty-two; the whole alimentary canal a little over ten feet. Kidneys normal.

This case, in addition to its great interest as an instance of very close merging and fusion of two heads into one, affords an example of multiple vices of conformation resulting from arrests of development, a coëxistent condition not unfrequently met with in double monstrosities. Acrania, spina bifida, absence of diaphragm, and of left pleura, hyper trophy of spleen and liver, make up a very respectable catalogue of pathological anatomy. In my essay, above referred to, there will be found an account of over forty cases of Diprosopus, human and animal, illustrated with nineteen lithographic figures.

A CASE OF FRACTURE OF THE NASAL BONES TREATED BY AN IMPROVED METHOD.

LEWIS D. MASON, M.D.

Since demonstrating my operation for depressed fractures of the nasal arch, before the Anatomical and Surgical

Society, I have been enabled through the courtesy of my colleague Prof. Jarvis S. Wight, M.D., to test its merits on the living subject, and take pleasure in presenting the notes of the case as reported by Dr. Beasley, House Surgeon to the Long Island College Hospital.

John Grady, æt. 14, U. S., school-boy. On April 5, 1880, fell from a wagon, striking upon his forehead and face, sustaining in addition to contused and lacerated wounds of forehead, and upper lip, a compound and comminuted fracture of nasal bones, with fracture of nasal processes of sup. maxillæ. He entered the Long Island College Hospital for treatment the following day, April 6th, and was seen by Prof. Wight, then on duty, who requested Dr. Mason to take charge of the case and perform his special operation, for fractures of this class.

The patient was etherized, in the presence of the medical class and the resident staff of the hospital. A careful inspection of the fractured bones was made. The nasal processes of both superior maxillæ were involved. The line of fracture of left was near the base of the process, on the right side near its middle. The bridge was very much depressed and flattened. The right nasal bone was lateralized to the right, and made a small puncture through skin on that side. There was considerable œdema of eyelids, and the face was somewhat puffy. Viewed from either side the deformity was very great, the end of the nose seeming to be at right angles to the depressed bridge.

After elevating the depressed fragments, and overcoming the deformity as much as possible, in the usual manner, Dr. Mason passed an ordinary surgical needle (ground to a drill point) through the line of fracture on either side, thus supporting the nasal arch.

To complete the dressing and give it further stability, a piece of thin rubber about half an inch wide was slipped over the head and point of needle, and rendered moderately tense, so as to exert a gentle compression. Small pieces of cork were placed on the head and point of needle, to protect the face.

The patient was placed in bed, head slightly elevated and evaporating lotions of an agreeable temperature applied to face and nose over the dressing.

With the exception of some suppuration from the wound upon the forehead, œdema of face, and a smart secondary hemorrhage from coronary artery of upper lip, the case progressed favorably until the eleventh day, on which date the needle was easily removed without an anæsthetic, and without pain to the patient. At this date there is a slight ulceration at seat of needle punctures, but of so slight a character, that the cicatrix if any, will be scarcely noticeable.

The contour of the nose is excellent over site of needle, a slight periosteal thickening renders the bridge of nose a line or so too prominent, but this is observed only on close inspection, and will undoubtedly in due time be absorbed.

At no time subsequent to the operation was there any pain or uncomfortable sensation at the seat of the needle. Nor did its removal cause any suffering. The result may be said to be perfect.

The boy remains in the ward for future observation, and has recovered entirely from his severe fall.

In commenting upon the notes of the case, I would lay stress on the fact that the presence of the needle was not at any time painful, nor even uncomfortable to the patient, and further that it was easily removed and without pain, ether not being necessary.

The ulceration at the site of the needle puncture was insignificant, although the needle remained in eleven days, a longer time than was probably necessary.

The ability to use evaporating lotions over the dressing is a valuable quality of this special method, and it afforded an opportunity to use intra- as well as extra-nasal applications with equal facility.

Finally I would call attention to the firm and efficient character of the appliance, as contrasted with the easily disarranged and usually inefficient dressing generally resorted to in this class of injuries.

At this date, April 21st, or fifteen days from the date of operation, the nose is quite shapely and firm.

Historical and Bibliographical Notes:

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M. D.

V. GABRIELLO FALLOPIO.

1523–1562.

FALLOPIUS was one of the distinguished trio which the world has selected to bear the preëminent title of "the great restorers of anatomy." Sketches of two have already been given in this series—Vesalius, of Brussels, and Eustachius, of Rome. Their researches were, however, so original and were crowned by so many actual discoveries, the systems of anatomy and physiology which they elaborated and left to posterity are such monuments of accuracy and scientific genius, as compared with the meagre, erroneous, and altogether sorry little epitomes of previous writers, that they would seem rather to deserve the title of founders than that of mere restorers. Anatomy had scarcely reached the dignity of a science before these great men took their scalpels and quills in hand, as it certainly did through their united researches, discoveries, and literary contributions.

Gabriel Fallopius, who descended from a noble family, was born at Modena, in Italy, as is generally stated, about the year 1523. Historians are divided both as to the year of his birth and that of his death, and hence concerning his age. Camillus, Ghilinus, James Philip Tomasinus, and Nicolas Comneus Papadopoli, (*Hist. Gymnas. Patavin. Tom.* II, p. 315) declare that Fallopius was born in 1490, and died in 1563, in the seventy-third year of his age. Astruc inclines to this opinion, and remarks, "which opinion, not only the authority of the above authors, but likewise the various and numerous functions which he executed, seem to confirm; as also, his long travels over almost all Europe, and the office of professor in the University of Pisa, before he accepted the offer of the Senate of Venice, and settled at Padua; all which could scarce be executed in less than seventy-three years." On the other hand Thannus (*Hist. of his own times*, *Lib.* 34,) and Castellanus (*Lives of celebrated physicians*) affirm, that Fallopius ended a prosperous life prematurely, being born in 1523 and dying in 1562, at the age of thirty-nine.

Fallopius studied medicine at Ferrara under the famous masters, Antonio Musa Brassavola and John Baptist Montanus, as we learn from one of the works of our author (*De Morbo Gallico*, Cap. 47). He is said to have enjoyed a strong and vigorous constitution, and extraordinary mental ability, which received the highest culture in most departments of learning. He was an eminent practitioner of medicine as well as an untiring student. He was appointed professor of anatomy at Pisa, in the year 1548; and in the year 1551, at the instance of the Grand Duke of Tuscany, Cosmo I, he received a professorship at Padua, as successor of the renowned Vesalius. Here besides the chair of anatomy and surgery and of botany, he also held the office of superintendent of the new botanic garden in that city. Surely the title of professor in those days was no sinecure. He remained in Padua to the day of his death, which occurred on the ninth of October, 1562. Having enjoyed a brilliant career he was very properly succeeded by his favorite pupil Fabricius ab Aquapendente, who had been for some time previously his anatomical demonstrator. His collected works, as published in Venice, 1606, embrace twenty-four treatises distributed in three folio volumes, containing in all over 1500 pages. Only one of his works was published during his lifetime, viz., his *Observationes Anatomicæ*, Venice, 8vo, 1561, which is considered one of his most valuable, containing as it does most of his discoveries and his animadversions on the works of other anatomists and particularly his numerous corrections of the errors into which his distinguished predecessor, Vesalius, had fallen.

Willis, in his life of Harvey (London, 8vo, 1878, p. 101), says: "Fallopius shows himself at all times so adverse a critic of Vesalius, that he seems to have been animated by something like personal hostility toward him. Fallopius had for many years been engaged obscurely, but usefully, as prosector in the anatomical theatre of Padua, and probably looked to the professor's chair as his rightful inheritance when Vesalius was appointed over his head. More than this, Vesalius being engaged in seeing his great work through the press at Basle in 1541 and the early part of 1542, Fallopius appears to have acted as his substitute for a term; and as 'two stars keep not their orbit in one sphere,' smothered dislike broke out at length into the open enmity which is unhappily transmitted to us in the writings of Fallopius." The same spirit is said to have been shown toward his contemporaries generally.

He was the first anatomist who described the ethmoid and sphenoid bones, the muscles of the soft palate, and the villi and valvulæ conniventes of the small intestines. He also described the ear more minutely than had ever before been done. He discovered the little canal along which the facial nerve passes after leaving the auditory; it is still called the *aquæductus Fallopii.* He demonstrated the fact of the communication of the mastoid cells with the cavity of the tympanum; and also described the fenestræ rotunda and ovalis. In the treatment of diseases of the ear, he used an aural speculum, and employed sulphuric acid for the removal of polypi from the meatus. In some of his supposed discoveries he had been long anticipated; for example, the tubes which bear his name were known and accurately described by Herophilus over three hundred years before the Christian era, and also by Rufus of Ephesus, of whom Galen speaks as the best anatomist of the second century. Rufus refers to two varicose and tortuous vessels passing from the testes (as the ovaries were called) to the cavity of the uterus. Fallopius, however, gave a full account of their course, position, size and structure. He cut into them and found them hollow, gave them the name of tubæ seminales, and posterity attached his name to them, and in time came to a better comprehension of their true function. This is not the only instance in the history of anatomical discovery where the name of a person, not its discoverer, has been given to an organ. Allusion has been made to Fallopius as a botanist; a genus of plants, *Fallopia*, has been named in honor of him. He wrote on metals, baths, syphilis, and various subjects, as the following titles will show.

Before giving a list of the several editions of his works, I will mention the fact that some authorities maintain that all of his works, except his *Obs. Anatom.*, were published, not from his manuscripts, but from the notes taken by the pupils who attended his prelections. In support of this, it is stated that the style of the several treatises differ essentially and to a degree that precludes the possibility of their having all been written by the same author. Fallopius read most if not all of his lectures, and it is probable that his manuscripts were used and more or less touched up by those who edited them after his death.

Obs. anatom. lib. v. Venetiis, 1561, 8°; Parisiis, 1562, 8°; Helmstadii, 1585, 1588, 8°. *Libelli duo, alter de Ulceribus, alter de Tumoribus*, etc. Venet., 1573, 4°; Erfurti, 1577, 4°. *De Thermalibus aquis.* lib. vii. *De metallis et fossilibus.* Venet., 1564, 4°; 1569, 4°. *De Morbo Gallico tractatus.* Venet., 1564, 4°; 1574, 8°. *De Simplicibus Medicamentus purgantibus.* Venet., 1666, 4°. *Opuscula varia.* Patavii, 1566. *Expositus in librum Galeni de ossibus.* Venet., 1570, 4°. *De Compositione Medicamentorum.* Venet., 1570, 4°. *De parte Medicinæ quæ Chirurgia nuncupatur, necnon in Librum Hippocrates de vulneribus capitis*, etc. Venet., 1571, 4°. *De humani corporis Anatome Compendium.* Venet., 1571, 8°; Patavii, 1585, 8°. *Lectiones de partibus similaribus corporis humani.* Noribergæ, 1575, fol. *Opera genuina omnia.* Venetiis, 1584, 1596, 1606, folio; Francofurti, 1600, folio, and supplement, 1606.

EDITORIAL DEPARTMENT.

SCIENTIFIC PATHOLOGY IN AMERICA.

The publication of Virchow's *Cellular Pathology* in 1858 marks an important epoch in the history of medicine. The fact that all forms of disease find their explanation in some disturbance of living cells somewhere in the body, is now accepted throughout the world. Under the impetus of this generalization, pathology has become an exact as well as a clinical study. Histology has risen to equal rank with anatomy, and the microscope can no more be dispensed with than the scalpel or the stethoscope. American medicine, however, relying perhaps too firmly on her proud clinical career, is only tardily recognizing the new order of things. Hence the reproach that American medical literature, however brilliant when treating of the clinical phases of disease, is apt to be found superficial and inaccurate in the elucidation of pathological facts and principles. Throughout Europe the case is different, and even from India, China, and Japan we are receiving thoroughly wrought contributions to our knowledge of the general pathology of man.

The fault lies partly with the schools and partly with the profession at large. A student of medicine will naturally apply himself to those branches on which stress is laid by his preceptor and his professors. For a number of years it has been the custom of American colleges to mention microscopic anatomy as an appendage to some one of their chairs, and here and there separate lectureships have been established; but very few of our institutions afford any facilities for the practical study of histology, and we know of but one college in the country where every student is required to pursue a course in the histological laboratory and pass a stringent examination in that department before receiving the diploma of the college.

The colleges, however ,can scarcely be expected to insist upon a high standard of requirement in opposition to the sentiment of the body of the profession. So long as the preceptor at home can see no practical use in what he is pleased to call high-flying studies, leading to nothing but fine-spun theories, the student in college is justified in confining his attention to those branches whose utility is no longer questioned. Nevertheless the world does move, and in the struggle for existence, even physicians are subject to the law which awards survival to the fittest. That is to say, the man who knows the most—other things being equal—will distance in the race for life those competitors who know less. And no man can hope to carry in his head the innumerable items of medical knowledge which are necessary to a successful practice unless he be practically grounded in the fundamental facts of pathology.

It follows that such progress in the study of normal and morbid processes as may be necessary to place us on an even footing with our brethren in foreign parts must be attained through the hearty coöperation of the academic and the non-academic members of the profession. The colleges must lengthen their terms, extend their facilities, and increase their exactions. And the great body of those gentlemen to whom academic studies are a thing of the past, must do the best they can under the circumstances to bring themselves into accord with the progressive spirit of the times.

THE PORRO OPERATION.

Among the recent outcomings of the antiseptic system of Prof. Lister, the Porro modification of the Cæsarean section may be considered as one of the most important. The rationale of this operative procedure is based upon the well established fact, that the removal of the uteri of pregnant animals after ligature of the cervix or vagina is attended with far less danger to life than the Cæsarean section.

The credit of having first conceived this modification of the classical Cæsarean section seems to belong to Dr. Cavallini, who, in 1769, performed a series of very elaborate experiments upon the lower animals, with the view of determining the comparative mortality of simple incision and removal of the contents of the gravid uterus, and the extirpation of the uterus after ligature of the upper part of the vagina or of the cervix. He was led to the conclusion by the results of these experiments that the latter method was worthy of trial in the human female. These experiments were subsequently repeated by Blundell, of London, and the results obtained by Dr. Cavallini's experiment confirmed.

In spite of these experiments and the suggestions which they naturally called forth, it was not until more than a century after the first recorded experiments of Cavallini that Prof. Porro, of Pavia, Italy, emboldened by the magnificent record of the Scotch and English surgeons in ovariotomy, the successes of Péan who saved seventeen out of twenty-four cases of uterine ablation by abdominal section, and above all by the valuable results of Listerism, deliberately planned and first executed the operation which now very justly bears his name.

It has been claimed in this country, and with some show of reason, that an American surgeon, Prof. H. R. Storer, of Newport, Rhode Island, was the first to perform ablation of the uterus after removing the child by the old Cæsarean operation. True it is that Dr. Storer did remove the uterus in the manner claimed for him ; it was not a part of his plan so to do however, but was simply a *derniér ressort* to arrest the hemorrhage following an incision into a uterus incapable of contracting because of a thickened and diseased condition of its walls.

So far as the difficulties of the operation itself are concerned the argument is altogether in favor of the old operation, inasmuch as shoemakers, ignorant midwives and various persons other than qualified practitioners have been known to successfully perform the Cæsarean section. With ablation of the uterus added however, nothing short of that skill and courage born of a thorough knowledge of the anatomical relations of the parts involved in the operation will suffice to assure the operator of success. Although these considerations would lead us to conclude that the new operation is a very much more hazardous procedure than the old method, yet a comparison of statistics shows that the Porro modification has the lesser mortality.

This operation may now be regarded as established as one of the legitimate operations of surgery. The days of the simple Cæsarean section with its awful fatality are numbered. Lives that would otherwise have been lost will be saved, and still more this operation will have removed from the poor rachitic creatures, which have been its most usual subjects, the possibility of their incurring its dangers a second time. The successes which have crowned the Porro operation demonstrate brilliantly the possibilities of abdominal surgery and add increased renown to the antiseptic method.

THE CLINIC.

OPTICO-CILIARY NEUROTOMY. MATTHEWSON. F. A. G., 59, machinist. Eyes weak for years past from straining at employment. Fifteen years ago, left eye injured by a fragment of steel which struck, but did not enter it. Inflammation followed, resulting in adhesions. Sight gradually failed, and was lost entirely after nine years. For past four months has suffered frequently from inflammation following use of sound eye. Enucleation indicated, but enervation or optico-ciliary neurotomy tried instead, for cosmetic effect. April 5th, a meridional incision made with straight scissors through conjunctiva and capsule, down to sclera, back and beyond posterior pole of eye, and between superior and internal recti, till optic nerve could be felt by little finger. Nerve cut with blunt scissors curved on flat. Tissues drawn apart with strabismus hooks, and posterior pole of eye drawn forward by double hook inserted into sclera near optic nerve. Posterior portion of globe near nerve entrance cut away with scissors, in hope of severing posterior ciliary nerves, which are the active agents of sympathetic irritation. Hemorrhage pushed globe forward preventing reunion of severed structures. Cornea at once insensible, and remains so now, April 8th. Exophthalmia now subsiding. Cornea clear and motion and position good.

EXTENSIVE FRACTURES OF UPPER EXTREMITY. WIGHT, Long Island College Hospital. S. R., æt. 28, Nova Scotia, March 8, 1880, fell fifteen metres to the deck of a ship, sustaining a compound fracture of the left ulna, and a compound comminuted fracture of the left humerus at the junction of the surgical neck and the shaft. A longitudinal incision was made through the deltoid beginning at the acromion process; the fractured end of the upper fragment was trimmed off, leaving it 2.5 cm. long; the upper end of the lower fragment was found denuded of periosteum, necessitating the removal of 3 cm. of bone with a chain saw, after which the prepared end of the upper fragment was telescoped into the medullary cavity of the lower fragment. The arm was then laid in a right-angled wire trough with wire shoulder-cap. Temperature did not rise above 38.3° C. Good result.

COMPOUND, COMMINUTED FRACTURE OF SKULL. WIGHT, Long Island College Hospital. J. S., policeman, aged 33, U. S. February 29, 1880, struck on the head with a missle which crushed in the left temporo-parietal region. March 1st, trephined. Two pieces of stone which had been driven under the skull were removed; also several pieces of bone, one being 2 cm. long, sharp-pointed and piercing the dura. The operation was followed by severe shock, and fall of temperature to 36° C. He rallied, and lay with paralysis of right arm, nearly complete aphasia, and impaired intellection till April 4th, when he died.

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ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

LITHOLAPAXY.*

By EDWARD L. KEYES, M. D.

ADJUNCT TO THE CHAIR OF SURGERY, BELLEVUE HOSPITAL MEDICAL COLLEGE, SURGEON TO BELLEVUE AND CHARITY HOSPITALS, NEW YORK.

YOUR president has asked me to demonstrate to you upon the cadaver to-night that new method of removing stone from the bladder, to which the name litholapaxy has been given by its inventor.

I call the method new, because it was only introduced to the profession by Professor Bigelow in January, 1878. It is therefore less than two and a-half years old; but it is a sturdy baby, well able to walk alone, and its acquaintance has already been made by some of you.

Many of you, however, have doubtless not yet seen the operation done, and a demonstration of the details of operative procedure will therefore be interesting to you, and possibly of advantage to those among you who, being already familiar with the use of the lithotrite in the bladder in the performance of old-fashioned lithotrity, may desire to give your patients with calculus the benefit of the shorter road to cure.

I hope to show you to-night nearly everything of practical value which has been thus far accomplished in the operation by Professor Bigelow and others interested in it, both in the way of instruments and manœuvres. The future probably contains much more than I can tell you now, especially in regard to instruments. For the operation is indeed largely a mechanical triumph, and further mechanical improvement in the apparatus is possible.

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* Delivered before the Society March 29, 1880.

Special instruments possessing certain definite capabilities are absolutely essential to the performance of litholapaxy, and in this direction improvements are constantly being made, and will continue to be made for some time to come. The active mind of Dr. Bigelow is not yet satisfied with its achievements, and has devised within the past few months two new washing bottles, a modification in the toe of the female blade of the lithotrite, a new beak and a new handle for the searcher. All of these instruments I shall be able to show you to-night, together with Sir Henry Thompson's two washing bottles and tube, and other instruments which have been used in the operation.

QUESTION OF PRIORITY.—Litholapaxy is a new operation. To crush a stone partially and pump out the fragments is not litholapaxy, but lithotrity. Crushing a stone in some rude way and then and there evacuating the fragments was practiced, if we may believe history, so far ago as in the very beginning of the ninth century upon the old monk Theophenes. Civiale, the Fulton of lithotrity, first successfully applied his *litholabe* upon a living subject in January, 1824. The earlier operations of this pioneer in lithotrity were marked by the length of the sittings, and an effort to do, if possible, all the work at one time; but advance and improvement in the French method culminated in the rule that the instrument should not remain in the bladder more than two or three minutes in any given sitting, and the sittings were only repeated after an interval of several days.

Heurteloup, whose *percuteur*, the rough model of all subsequent lithotrites, was given to the world in 1832, habitually removed calculi at a single sitting, and with great success, since, in an essay written in 1847,* he allows only three deaths in sixty-nine cases. Heurteloup, however, did not so impress the community as to make his method popular or universal.

Indeed all the early operators had in view the removal of the stone by lithotrity as promptly as possible, and many of them devised special instruments for the purpose. The discharge of detritus was favored in some cases by the injection of water through a large-eyed catheter, but generally a sort of double scoop, which could be opened and brought together, was the instrument used to effect the extraction of small stones, and of the fragments of larger stones, after they had been perforated and broken up.

To such an extent was this alleged immediate extraction of stones and debris carried that in 1846, on April 27th, before the Académie des Sciences,† Leroy d'Etiolles claimed to be able to extract from the bladder in one sitting a stone thirty-five millimetres in diameter (a little over 1⅓ inch), and at the same meeting he boasted of success by the rapid operation and immediate extraction in more than a hundred cases.

Heurteloup, at this same meeting of the Academy in 1846, made a communication concerning a new instrument like his percuteur, except that its jaws were spoons, destined to extract small stones and the debris of large broken ones from the bladder; and in the following year, 1847, his rather pretentious volume, already alluded to (*De la Lithotripsie*, etc.) appeared, in which he claimed such good success for rapid lithotrity with immediate extraction.

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* De la Lithotripsie sans fragments au moyen des deux procédés de l'extraction immédiate ou de la pulvérisation immédiate des pierres vesicales par les voies naturelles, par le baron Heurteloup, 1 vol. 8vo. avec planches. Labé. Paris, 1847.

† Comptes rendus des Séances de l'Academie des Sciences, 1846, i, p. 704, and Gaz. Med. de Paris, May 2, 1846, p. 354.

In view of these facts, it may well excite wonder that the idea of rapid lithotrity with immediate and complete evacuation did not gain favor in the early days of stone crushing, and that this idea was condemned and finally lost sight of. On the contrary, we find Civiale favoring short crushings, without evacuation, and with long intervals of rest, and doing so with increasing dogmatism, as prolonged experience in his high position rendered him master of his subject.

An explanation of all this seeming mystery becomes simple when the facts are better known.

Anæsthesia was not used when lithotrity was young. The earlier perforating and crushing instruments were imperfect in structure, the whole machinery, including the operating table, was mechanically complicated, and evacuation of detritus was usually attempted by dragging out through the sensitive urethra an instrument charged with debris. The instrument of course, had to be reinserted for each load it brought away.

When added to this, it is taken into consideration that the early champions of lithotrity had to contend not only with hostile advocates of the cutting operations and the great body of the conservative surgeons of the day, but also with each other, for their bickerings were disgracefully active, it becomes a matter of admiration that lithotrity ever succeeded at all in becoming established as a justifiable surgical procedure. That it did so succeed is due largely to the genius, the honest zeal and untiring patience of that master spirit Civiale.

Heurteloup, whose name generally stands second to that of Civiale in the history of lithotrity does not seem to have possessed either a scientific spirit or sound doctrine, while his instruments for withdrawing stone from the bladder are open to the objections already alluded to.

That Heurteloup was not broadly scientific is shown by the quality of his writings. He is constantly speaking of something undone which he has not yet in hand and which he proposes to publish at a later day. This reproach was made even of his famous monograph "de la Lithotripsie sans fragments, etc.," in 1847, by the reviewer in the *Archives Générales.*[*] His narrowness is further shown by his treatment of Civiale to whom after first professing friendship, he became later bitterly hostile. It is shown by the secrecy which he maintained as to his methods and as far as possible his instruments, as attested by Civiale,[†] who quotes Rigal in confirmation of his statements.

That Heurteloup was unsound in doctrine is shown by his own writings; for in a book[‡] published in London, 1831, he states several times and emphasises it with italics, that it is not necessary after lithotrity to take away all the detritus; that the greater, coarser portions may be readily removed by his evacuating instrument, *and that what is left will dissolve in the urine.*

What more arrant heresy could have been emitted to damn lithotrity at its birth.

It is very clear that rapid lithotrity as performed by Amussat, by Leroy d' Etiolles, by Heurteloup, and others was an unsurgical procedure. Therefore it could not stand the test of experience by a wider trial in the hands of the general surgeon. Even Heurteloup gave up the effort toward the end of his career, and rapid lithotrity disappeared and bears no relation to the litholapaxy of Bigelow, which we are considering to-night.

Following lithotrity into England, we find scattered accounts of rude operations, but no very systematic adoption of lithotrity until after the visit of Heurteloup to London, at which time he secured a number of successful cases and published the treatise already alluded to. After this, a number of surgeons took up the operation which gained in favor, and finally secured the sturdy advocacy of Sir Henry Thompson, who became its apostle and a recognized authority upon all questions bearing upon the operation.

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[*] 1874, xv, 4th series, p. 141.

[†] Traité de la Lithotritie, 1847, p. 448.

[‡] Principles of Lithotrity, London, 1831.

Thompson followed the conservative gentle methods of Civiale and acquired an enormous experience. In March, 1878, in an admirable paper before the Royal Medico-Chirurgical Society of London,* he presented an analysis of 500 personal cases of removal of stone from the male adult. At this time he favored short intervals between the crushings, and was inclined to leave to lithotomy such stones as could not be crushed in three or four sittings. In cases where cystitis followed the crushings, due to sharp fragments of stone left in the bladder, Thompson had come to consider it advisable to give ether and remove all the debris with Clover's evacuating bottle.

The general tone of the discussion at this meeting of the Society, went to show that in the minds of the best English surgeons, lithotrity had been pushed up to its justifiable limits and that probably in the future it would be well to leave more stones to lithotomy, reserving lithotrity for cases in which the size of the stone was such that few sittings would be called for, and the bladder might be promptly freed of the detritus.

Matters stood at about the same level in this country at this time. The advocates of the median and supra-pubic cutting operations were pushing the claims of their methods for supremacy, and lithotrity had but few serious supporters.

Now a new departure has been taken. Bigelow's operation is gaining favor in England and in this country. The names of new surgeons constantly appear in the journals with successful cases advocating the operation. Thompson has practically adopted the suggestions of the method, and in a recent issue of the Lancet,* gracefully acknowledges the value of the improvement which Bigelow instituted.

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* London Lancet, March 16, 1878, p. 385.

Thompson had been working in the same direction and teaching the value of rapid work, short intervals and prompt removal of debris, using ether more freely and shortening the total duration of the treatment, but it fell to the lot of Bigelow to consummate the plan and crystallize the operation into a distinct new method, litholapaxy, which now promises in the adult male to displace ordinary lithotrity almost entirely, and to force lithotomy into a position of minor importance.

Litholapaxy may be defined as an operation which aims at prompt entire fragmentation of calculous material in the bladder with immediate and entire removal of the debris by aspiration through a tube passed by the urethra, disregarding the length of time employed in the operation, so long as the patient's general condition is good.

The same motives which would arrest any other operation before its completion hold with equal force here, but if the general condition of the patient is good, and a fragment of any considerable size remains, the operation may be continued according to Bigelow without regard to time until the desired result is obtained, and no harm is likely to come to the patient from the prolonged manipulation of the bladder, provided the different operative manœuvres be conducted with becoming gentleness, and no unnecessary violence be inflicted upon the bladder or urethra.

This operation, so defined, is new. Professor Bigelow naturally prefers his own instruments for its execution, but they are not essential. With or without an anesthetic, any lithotrite may be used, any evacuating catheter, any washing bottle, and the operation remains the same, providing the aim of the operator is to relieve the bladder entirely of debris by aspiration, without taking into serious account the length of time consumed.

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* January 17, 1880.

Stokes,* of Dublin, on December 5, 1879, read a paper before the Surgical Society of Ireland, reporting his first case of Bigelow's operation, in which he successfully removed 56 grains of stone from a patient in one hour and ten minutes. He stated that Bigelow's operation was performed in the Meath Hospital many years ago by Sir Philip Crampton, showing the original instrument, and claiming that the principle of its action is the same as that of Bigelow.

This statement, however, is not justified by a perusal of Sir Philip's admirable paper on lithotrity which he delivered at the opening of the Meath Hospital. The paper appeared in the *Dublin Quarterly*, 1846, vol. i, p. 1, and the apparatus is described in it.

Crampton's evacuating bottle was devised to get detritus out of an atonied bladder, and was not designed for use upon the healthy organ. It was a strong oval glass vessel capable of holding a pint and a half, with a metal tube attached of one half inch bore furnished with a stop-cock. From this receptacle the air was drawn out by an exhausting syringe. One of Heurteloup's wide-eyed steel evacuating catheters was then introduced into the atonied bladder full of water in which a stone had been crushed, and, being coupled to the receiver, the stop-cock was turned and the contents of the bladder and the detritus were sucked out. The editor of the journal states in a note† that he saw in this manner two drachms of pulverized calculus drawn out at one time, "the experiment" being a "complete success."

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* *Brit. Med. Journ.*, Feb. 7, 1880, p. 210.

† Page 22.

A successful operation upon a Mr. Rodger, past 70 years of age, is also chronicled. Mr. Rodger had an atonied bladder, and had been previously operated upon by Heurteloup without entire success.

How little this method is like that of Bigelow is shown by Sir Philip's caution about throwing water into the bladder. He states that great care is necessary not to introduce fluid too rapidly into the bladder, since "more than one fatal case" had "arisen from this cause." The water he believed should be thrown slowly into the bladder, imitating the descent of urine from the kidneys.

There is one feature of all former injecting and evacuating apparatus which destroys the claims of their inventors for priority over Bigelow. They were designed in the main to assist nature when the bladder was atonied, not to substitute nature when the bladder was strong. Catheters of all sorts have been used from the earliest time, and more or less debris came through them.

Heurteloup's large-eyed steel catheter with a large jointed stylet is still used. Leroy d'Etiolles, Cornay, Mercier, Nélaton, Maisonneuve, Clover, Coxeter and others devised evacuating tubes of more or less value. With these were used syringes and rubber bulbs and exhausted air bottles and aspirating pumps, but they were generally condemned except for occasional use, and were more particularly reserved for cases in which the bladder had lost its own evacuating force from atony. Clover's bottle, which has perhaps received more general use than any other, might reasonably well execute litholapaxy, but it was not designed for that purpose, and has been displaced by several better washers.

Cornay's *lithérétie*, described and pictured by Mercier,* is an instrument much like that of Sir Philip Crampton, already described, but superior in that it combined injection through a double-current catheter with pneumatic aspiration. A description of this instrument appeared in 1845, Sir Philip's in 1846. Neither of them aimed at executing litholapaxy, as I have defined it.

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* Traitment préservatif et curatif des sédiments, de la gravelle, etc. Paris, 1872, p. 372.

The nearest approach to Bigelow's washing bottle with which I am familiar is the instrument devised by Mercier, and pictured by him in his treatise already referred to at page 373. It has the same rubber bulb and a similar glass receiver below it as Bigelow's first washer possessed. It was filled with water, attached above to a flexible catheter, worked by alternate compression and relaxation of the rubber bulb (without valves), and the detritus was collected in the glass receiver below just as it is in Bigelow's and in Thompson's washers; but Mercier expressly states (page 370) that he devised his washer to meet the same requirements for which other washers had been constructed, and to be used "quand la rétention devient complète," in short for cases of atony, for patients who were unable to rid their own bladders of the debris of a broken stone by muscular contraction—litholapaxy was not contemplated by Mercier.

Sir Henry Thompson's excellent washers were devised to do exactly what Bigelow's instrument had done, to rid the bladder of debris under all circumstances, and these bottles performed their function exceedingly well, and more agreeably at my hands than the first washer of Bigelow. Bigelow's last washing bottle * I have not yet used upon the living subject. Its mechanical design seems perfect, and it undoubtedly does its work well.

I shall not detain you longer with matters of history, interesting though they are, but proceed to show you the instruments which have been employed and are now in use, and to demonstrate the action of the same upon the cadaver.

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* *Boston Med. and Surg. Journal.* 1880. Jan'y 8, p. 25.

I have recently furnished an article upon litholapaxy, detailing in full my experience with the method, giving statistics and a tabulated analysis of cases, together with all the deaths on record and certain practical suggestions gathered from my experience. This article will appear in a few days in the April issue of the American Journal of Medical Sciences. It is unnecessary for me to repeat here what may be read there, and I must refer those of you who are interested in the subject to that source for some practical points upon the operation in the way of manœuvres and results which lack of time forbids me to enter upon here.

MORTALITY.—In that article are collated 107 operations with 6 deaths. Since the manuscript went to press (Feb. 15th) I have learned of 13 other successful cases. One of these was a published case of Dr. Caswell, of Providence,* which I omitted to record. 12 are new cases, most of which have appeared in print. This makes a total of 120 operations with 6 deaths, one in twenty cases, a mortality of exactly five per cent. for all operations taken together, a result which probably could not have been reached by the same surgeons upon the same patients by any other operation, since the average age of the patients was high—certainly over 55 years.

TIME TO BE EMPLOYED.—Regarding the amount of time which may be employed to perform the operation something may be said.

When Professor Bigelow announced the operation to the surgical world much doubt was felt as to the advisability of subjecting the bladder to prolonged manipulation. A cardinal maxim in lithotrity at that time was to make the sitting short, to leave instruments in the bladder for as short a time as possible, and it was a rude shock to the lithotritists of the day to be told that they might work for two or three consecutive hours in the bladder without harming the patient. In a conversation recently, Professor Bigelow remarked to me that it made no difference if the operation lasted a week, indicating his entire disregard of time as an element to be considered in the operation. Bigelow, from the first, has maintained that rapid lithotrity should be done slowly.

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* Boston Medical and Surgical Journal, Jan. 29, 1880, p. 101.

In this statement he is certainly correct, for by slowly he means deliberately, carefully, disregarding time as an element of the operation. By such a method of operation alone can that gentleness of manipulation be assured which shall spare the bladder and urethra as much violence as possible. But when this gentleness of manipulation has been attained nothing more can be expected from slowness and deliberation in operating. Other things being equal the more expert the operator, the more rapidly will he finish his work, using the same or greater gentleness than another whose touch is less familiar with the business in hand. Prolonged etherization alone is harmful to some patients, and if only on this account brevity in the operation is desirable. That Bigelow believes this is shown by the large size of the tubes he advocates and habitually employs. Thompson, who has performed rapid lithotrity more often than any one else, has gradually extended the limit of time, he is willing to allow for an operation. His last utterance places it at about half an hour, but the wonderful dexterity of this veteran operator would ensure him a yield in a half hour possibly twice or three times as large as the general surgeon could aspire to in the same time, and for the general surgeon the caution is a wise one that no sacrifice of patient gentleness is allowable in this operation in order that few or many minutes may be saved. My experience has taught me that an operator reasonably well versed in the old method may find great variations in regard to time with the new method, but should expect to average about 5 grains of dried stone for every minute of operation, especially if the stone be large, and should reach a higher average yield with acid than with alkaline stones. Thompson's average yield as published is 16¼ grains to the minute for acid stones, 12½ grains for phosphatic stones. Thompson does not lose any time searching for last fragments. He prefers a supplementary sitting, and this with his marvellous dexterity of manipulation, has given him a very high average.

Bigelow, who practically disregards the element of time and whose first published series of cases gave the small average of three grains to the minute, informed me recently that in a favorable case, one of his last, where he had the operation timed for curiosity, he succeeded in evacuating between 750 and 800 grains of stone in 20 minutes. This was a phosphatic stone and is, I believe, the most rapid operation on record. The conditions must have been very favorable to have yielded 40 grains to the minute.

The most rapid case on record of simple evacuation without crushing, is that of Mr. Thomas Smith,* who washed out three ounces of small stones in 20 minutes from the bladder of a patient, and at a second operation upon the same individual got one ounce with crushing and washing in 24 minutes, an average of 72 grains for each minute of the first operation. This patient recovered, and has been recently reported in the Lancet as doing well.

The conclusions to which my experience in litholapaxy have thus far led me, are roughly as follows: I state them briefly as general conclusions which future experience may modify.

1. Litholapaxy is applicable to all stones in the adult capable of being broken by an instrument which can pass

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* London Lancet, Jan. 10, 1880, p. 44.

the urethra. Multiple stone is rather an advantage than otherwise where there is much calculous material.

2. Stricture does not contra-indicate the operation. If near the meatus it may be cut at the time of crushing the stone. If deeper it should be cut or stretched by preparatory treatment.

3. Prostatic hypertrophy is no bar to the operation so long as solid instruments of reasonable size can be made to enter the bladder without the use of force.

4. Age is no bar to the operation.

5. Inflammatory conditions of the bladder do not contra-indicate the operation, although, undoubtedly, a reasonably healthy bladder furnishes a better field.

6. Chronic Bright's disease, heart disease and general debility do not so seriously contra-indicate this operation as they do others upon the urinary tract and may be almost disregarded, unless so far advanced as to make any other surgical manœvure upon another part of the body undesirable. Preëxisting pyelitis is the gravest complication which can (immediately) compromise the success of the operation.

7. The operation should not be undertaken without a large previous experience upon the dead body or a small experience upon the living subject with old-fashioned slow lithotrity without ether.

8. A lithotrite which cannot be made to clog, will not readily catch the bladder, and is as small as will satisfy the requirements of the stone as to size and hardness is desirable. The tubes may be straight or curved as large as the urethra will admit comfortably after cutting the meatus if necessary, and any efficient washing bottle can be used which may suit the operator's fancy if it be a bottle which will not allow air, which may have accidentally entered the bladder, to remain there.

9. A surgeon should not undertake the operation unless he feels confident that he can recognize the fact at once if he catches the bladder, so that he may drop the fold of mucous membrane immediately without bruising it.*

I here show you a number of specimens of stone removed by litholapaxy that you may inspect the size and general quality of the fragments. The age of the patient, the time of the operation and the weight of the debris are marked upon each bottle.

Most of these instruments which I now hand around have been abundantly described in various places. The only new ones which need a few words of description are the lithotrite, the washing bottle, the searcher, and the washing tube.

The washing bottle is nearly but not quite the latest model of Prof. Bigelow.

This one has already been described in print.† I have not yet tried it upon the living subject. It is said to work very well. The modifications now being made are to discard the spherical shape of the receiver and return to the older shape, which is certainly preferable in that it allows inspection of fragments, as they drop into the receiver. Such inspection is difficult in the spherical receiver if the water be tinged with blood.

A new arrangement of suspension of the new bottle is contemplated, but its essential mechanical structure in all the features relating to its function remain unaltered.

The lithotrite I here show you is the very latest model devised by Dr. Bigelow. It was only finished last week. It varies from former models in having an extra forward curve at the toe of the shoe of the female blade, (this is for convenience of introduction), and two new spurs upon the sole of the male blade, for the evident purpose of making its prehensile power greater.

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* The lecturer here demonstrated upon the cadaver, the ease with which the bladder may be picked up in the jaws of the lithotrite, succeeding without difficulty in catching the bladder with Bigelow's lithotrite, with his own instrument and with other instruments. He believed the bladder of a dead man to be no more loose and flabby than the atonied bladder of a live old man with a large prostate.

† Boston Medical and Surgical Journal, Jan. 8., 1880.

The searcher which I now pass around has the same forward curve at its beak, giving the tip of the instrument an S shape which may be called the Bigelow curve. There is a ball like that of the lithotrite to grasp while searching, and a hard rubber corrugated cylinder with another smooth one of metal upon the shaft near the ball. The new tube is a straight one modified by Warren with the spiral tip, which I here show you.

PREPARATORY TREATMENT.—I think it better in all cases where inflammatory symptoms are at all active, that the patient should rest in bed for a few days before the operation is undertaken, drinking freely of Bethesda or Poland water, or taking a milk diet with a little of some bland alkaline diuretic, such as the citrate of potash.

If the urine be acid and reasonably clear, this is all the preparatory treatment required. Should the urine be ammoniacal, putrid, highly purulent, especially if atony of the bladder coexists with decomposition of the urine, the bladder should be washed out once or twice a day with a strong solution of borax in hot water, a tablespoonful (more or less according to the patient's sensibilities), of borax to the pint of water at above 38° C. (100° F). Benzoic acid or one of the benzoates may be administered by the mouth at the same time, if the stomach be vigorous, otherwise I prefer Bethesda or Poland water in free doses, from one to three pints a day.

In any case the urethra should be thoroughly tested with a smooth steel sound of large size to insure its patency, and that the operator may become familiar with any peculiarities of the canal.

None of this preparation is absolutely necessary, but it is desirable. On more than one occasion I have gone out of town to operate upon a patient who had no preparatory treatment and with the happiest result. But I have always gone prepared for any emergency.

Such ordinary treatment as the use of quinine and what anodyne may be required, is governed by the rules applicable to all cases of urinary surgery.

AFTER TREATMENT.—The after treatment is equally simple. The catheter may be required to relieve temporary retention of urine, the washings with borax are indicated in all conditions of atony or where the urine has been previously putrid in any degree, otherwise nothing is usually called for except a little quinine, more or less anodyne for a few days, a continuance of Bethesda water or the alkaline diluent, and rest in bed for perhaps a week. I am accustomed to assure a patient that if all goes reasonably well, he will be up and about in one week after his operation.

A final wash and search for possible last fragments can not be omitted after the patient is up and about before dismissing him as cured.

THE OPERATION.—The present method of operating followed by Dr. Van Buren and myself, is the following: The patient is left upon his back on his bed, which for the convenience of the operator, should be a high one. His hips are raised a little upon a pillow, and a rubber cloth is placed beneath him. One assistant attends to the ether, another to the washing bottle. No other assistants are necessary, unless the case is one of those exceptional patients who do not lie quiet, or who become rigid under an anæsthetic. In such cases two more assistants are necessary to hold the knees quietly apart.

If the urine has been ammoniacal and decomposed, the first step in the operation is to introduce a tube, and after having drawn off the urine, thoroughly wash out the bladder with a warm solution of borax. A little of this wash is left in the bladder and the crushing is then carried out according to ordinary rules, from six to twelve seizures being made in rapid succession until a fair amount of detritus has been created. Then the tube is introduced and the bladder washed so long as fragments continue to fall freely into the receiver, changing the position of the end of the tube in the bladder from time to time. The lithotrite is reintroduced and the washing repeated until the bladder is empty of stone. A little fine dust may remain and come away during urination, or even a small fragment may be overlooked or left behind knowingly, rather than prolong the operation greatly; I will show you the reason for this by washing in a flask presently. A large fragment should not be left behind, a small one or several of them do not inconvenience the patient or interfere with his prompt recovery from the operation, and much unnecessary time may be consumed in attempting to get it out.

[The lecturer now proceeded to demonstrate the operative manœuvres upon the cadaver and in glass flasks, prepared with a thin rubber cover over their mouths, tied tightly around the tubes so as to represent the contractile quality of the bladder as nearly as possible, and yet allow an inspection of the fragments as they were being washed out. All the various customary manœuvres were shown and the different instruments tested.]

Society Reports.

STATED MEETING, MARCH 15, 1880.

CASE OF EXTIRPATION OF BREAST FOR CARCINOMA, WITH EXTENSIVE DISSECTION OF AXILLA.

FRANK W. ROCKWELL, M.D.

Dr. Frank W. Rockwell presented a mammary tumor and several axillary lymphatic glands, which had been removed from a patient in whom the whole chain of lymphatics extending between the breast and clavicle was involved, and was removed at the time of the operation. The specimen showed a section of the main growth, above the nipple; the skin had already become involved, and was about to give way. It was accompanied with the following history.

The patient from whom this growth was removed was a thin delicate maiden lady, sixty-five years of age, and of fair general health. Her family history shows no taint of any kind, and her own health has been moderately good, though never robust. Ten years ago she was the subject of some form of nervous disease, characterized by epileptiform convulsions, which was finally cured, but left her with a chronic nervous tremor, from which she still suffers. Shortly after the disappearance of the convulsive seizures (1871), and about ten years after the menopause, she first noticed the present tumor, which was so ill-defined and painless that it was discovered by accident only. It remained in the same condition for the next nine years, never giving the patient any pain or annoyance until July, 1879, when it began to increase in size without any apparent cause, and became the seat of lancinating pains. In a few months the axillary glands became involved, and the tumor became prominent over the upper segment of the breast. The skin now began to redden, and fearing an open sore the patient for the first time sought medical advice.

I saw her December 9, 1879, when she presented the appearances described above. I advised immediate extirpation of the breast and the affected glands, which advice was concurred in by Dr. J. C. Hutchison in consultation. The patient was accordingly placed on a preparatory treatment for a few days, and on December 21st, with the assistance of Drs. Bunker, Pilcher and Mulligan, I removed the diseased tissues by the following method:

An elliptical incision, beginning at the upper border of the gland, was carried around the discolored skin to the lower border of the pectoralis major, and then back to the point of starting.

This was rendered necessary by the position of the skin involved, which would have made the usual incisions worthless. The breast having been removed by Billroth's method (which includes the dissecting off of the fascia from the pectoralis major), and all bleeding vessels secured by Péan's hæmostatic forceps, a second incision was made at right angles to the flap nearest the axilla, and prolonged over the enlarged glands to the inside of the arm.

Reflecting off the skin flap thus obtained, an opportunity was thus afforded to study and remove the axillary growths. The whole chain of glands between the breast and axilla was found to be affected, and their extirpation systematically undertaken. The more superficial ones were readily removed with the finger-nail and scalpel handle, but as the dissection was proceeded with, it was found that a large mass was adherent to the axillary vein. By gentle manipulation and careful use of the knife, an aneurism needle was introduced between the mass and the vessel, and the latter being thus drawn out of the way, the tumor was slowly dissected off from it, and safely removed.

Another mass found adherent to the long thoracic artery was removed with a portion of that vessel, which had been previously ligatured on the proximal side, about three inches from the axillary artery. The deeper glands were gradually removed in the same manner, and the chain followed up until those resting upon the first rib just below the subclavian artery were teased out with the nail, the finger being introduced between that vessel and the gland.

This portion of the operation was accomplished with no hemorrhage of any amount, one small branch from the axillary alone requiring ligature. When completed the operation had occupied an hour and a half, and the whole axillary space was cleanly dissected out, the vein being exposed for about three inches of its course and the second and third ribs laid bare.

On removing the Péan's forceps, I found but one or two vessels which needed ligature, and I am convinced that much of the success of the operation was due to the prompt and efficient manner in which all hemorrhage was controlled, thus rendering the dissection easier, and sparing a feeble patient all unnecessary loss of blood. On removal from the table the patient had a pulse of 120, rallied well from the anæsthetic, and passed a comfortable night.

On the following day about 8 c. c. of serous fluid were found on the dressings ; the drainage tube was shortened and dressings renewed.

Under carbolized dressings the wound healed well, and the patient was apparently progressing toward an assured recovery, when I noticed, on January 6th (16 days after operation), that the the wound, which was almost cicatrized, was reopening at its lower angle, and that the dressings were hardly moistened, the discharge having diminished since the day before, when laudable pus was being freely formed by the portion of wound yet unhealed. No odor nor any new symptom recognized by the patient showed any coming trouble ; the temperature and pulse were normal ; yet not liking the sudden cessation of reparative action, I left orders to be called if any new symptoms showed themselves. At noon the following day I was sent for, and found the patient in a most critical condition. She had been seized with a severe and prolonged rigor at 2.30 A.M., had failed rapidly, and was now delirious ; yellow dry skin, foul tongue, rapid and feeble pulse (140), and occasional vomiting. Her temperature was 103, and her respirations 42. She complained of severe pain in the right side, and was evidently suffering extreme dyspnœa. A diarrhœa had set in shortly after the chill, and had continued with moderate frequency since morning. Quin. sulph. .65 gm. with opii pulv. .065 gm. were at once given, and the patient put upon frequently repeated doses of quinine and hydrobromic acid. The diarrhœa was left to take care of itself, and brandy with milk regularly administered. The following day the patient's head was clearer, her pulse better, and the diarrhœa less frequent, and in a week her septicæmia had yielded and the wound was again beginning to secrete pus. It had opened through two-thirds of its entire length, and the additional drain of repairing it kept the patient for some weeks longer confined to her apartment. She has, however, now a fair use of the arm, notwithstanding the radical treatment adopted in regard to the fascia of the chest, and is about the house again with her average health and strength. The case is an interesting one in many respects. The only one I have been able to find which at all resembles it is one in which Billroth operated, removing the breast and subclavian glands, and which is enumerated with his fatal cases, though the cause of death is not given. The severity of the operation, the age and condition of the patient, and the fact that she has safely weathered one of the most serious of the surgical diseases which complicate or follow operations, has seemed of sufficient interest to warrant me in bringing the case before this Society.

MICROCRANIAL MONSTER; WITH CLEFT PALATE: COLON TERMINATING IN THE BLADDER: TALIPES VARUS IN A MARKED DEGREE.

FRANCIS H. STUART, M.D.

Dr. F. H. Stuart presented to the Society a monstrous fœtus, the history and the peculiarities of which he described as follows: Having been called in consultation by a midwife in a case of difficult labor, I found upon examination a soft compressible mass presenting which gave at first the idea of a breech; upon fur-

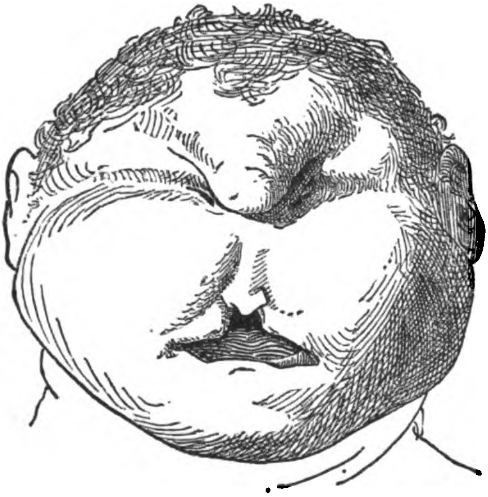


FIG. I. MICROCRANIAL MONSTER. FRONT VIEW.

ther examination however, ears, mouth and chin were made out so that a vertex presentation was clearly present, and an abnormal condition of the cranial walls evident. Delay in the delivery was being caused by the size of the shoulders. With the assistance of Dr. Szigethy, delivery was finally completed, but with rupture of the axillary vessels on both sides. The body weighed 47.63 kilograms (10½ lbs,) was that of a fœtus at term, and was unusually fat.

Of the face and head the annexed very life-like drawings, made for me by Mr. R. L. Dickinson, convey a better idea than any description. The projection from the forehead (?) was like a proboscis, 2.5 centimetres long. This contained nothing more than a little fat. Unfortunately I postponed the examination of the brain until it was so softened, that I could not determine the proportion of the parts of the brain. It seemed to be chiefly of the cerebellum. I could find rudimentary eyeballs.

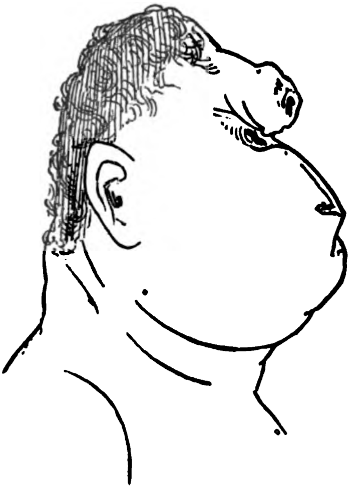


FIG. II. MICROCRANIAL MONSTER. SIDE VIEW.

The bones of the cranium and of the face were all rudimentary or imperfect, except the inferior maxilla and possibly the occipital; representing the left parietal was a spot of ossification not larger than a thumb-nail; the right parietal, though larger than its fellow, was very small.

There was complete cleft palate and harelip, so that the mouth and nasal cavity were one.

The thoracic organs seemed to be normal. Of the abdominal organs the liver was very large, extending from side to side of the abdominal parietes. From the median line to the right extremity it measures 9.5 centimetres, and from the same point to the left side 6.25 centimetres.

The colon was quite unusual. The caput coli was opposite the umbilicus. The colon was first transverse to the abdominal wall, then folded upon itself so as to come beneath the lower border of the liver along which it crossed the abdomen to the left side, passing behind the vena cava inferior. After reaching the left side it folded twice upon itself, then descending to a level with the crest of the ilium, it crossed directly toward the right iliac fossa. At this point it expanded into a large pouch 9 centimetres long and 4.5 centimetres in diameter, which rapidly tapered to a small tube 2.5 millimetres in diameter. This entered the bladder on the right of the median line and posterior to the right ureter, but a little nearer the median line. The colon could be inflated from the bladder, but air would not pass in the reverse direction. There was no appearance of an anus. Both ureters could be inflated from the bladder.

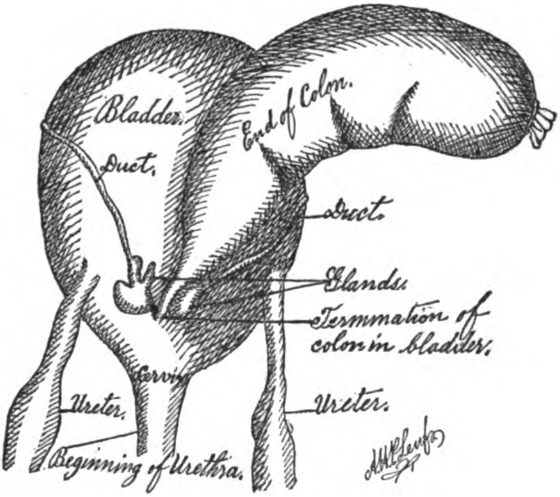


FIG. III. COLON AND BLADDER. REAR VIEW.

They are represented in the cut as dilated. The right ureter emptied 1.25 centimetres higher up than the left, supposing the body to be standing.

The genital organs were also very singular. There was a penis nearly 2.5 centimetres long, with a glans and prepuce. The penis was shortened on the under side so as to be slightly curved under in the position of chordee. The urethra passed along its under surface. What would be called the raphé of the scrotum was depressed between the two sides making the skin rounded and folded over so as to look in a remarkable degree like labia majora, an external appearance of hermaphroditismus. There was no opening in the raphé. On examining for a spermatic cord, the external abdominal ring on both sides transmitted only the ileo-inguinal nerve, and was filled with fat. But I noticed that some fibres of the outer pillar of the external ring passed down for insertion in the fascia of the inner part of the thigh. This was the case on both sides. 1.25 centimetres nearer the median line than the ureter was a small glandular body 15 millimetres long and 6 millimetres wide, from which proceeded a small cord, which went up along the bladder to within 2.5 centimetres of the urachus, when it formed an acute angle, and descended nearly horizontally backward to pass through the internal abdominal ring on to the external ring, where it ceased. At the acute angle above referred to was a small glandular ex-

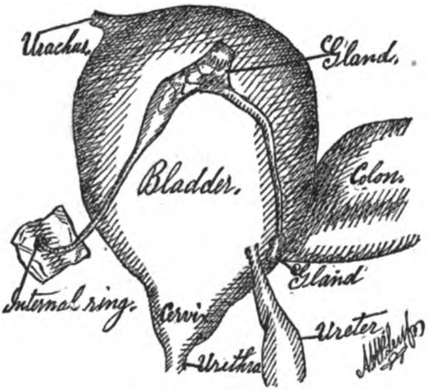


FIG. IV. COLON AND BLADDER. SIDE VIEW.

pansion of the cord. These bodies and the cord are admirably represented in the drawings made by Mr. Leuf.

There was talipes varus in so marked a degree that the plantar surface of the toes and ball of the foot looks toward the face.

EXTIRPATION OF THE LARYNX.

DR. GEORGE WIEBER..

The recent successful case of extirpation of the larynx in New York, by Dr. F. Lange, has awakened among us especial interest in this operation, as this is the first operation of this kind which has been performed in this country. It was done in consequence of the development from the upper part of the larynx of a sarcomatous tumor, which had reached nearly the size of an orange and had rendered both inspiration and deglutition impossible. The patient was a male, 74 years of age. The operation was performed October 12, 1879, and consisted in the removal, together with the tumor, of the entire larynx except the lower part of the cricoid cartilage, of the right wing of the hyoid bone, of the epiglottis and a portion of the anterior wall of the œsophagus.

The many difficulties and perils of the after treatment of the case were successfully overcome, and an apparatus devised by which both deglutition and articulation were made possible, and at the time the case was reported, four months after the operation, the patient was getting along tolerably well.

This operation has not yet been established as one of the accepted procedures of surgery, nor have its methods and the indications for it yet been formulated and introduced into any systematic surgical treatise in the English language. In view of the interest in the subject awakened by this case of Dr. Lange, I have complied with the request of our President, and have prepared a digest of the chapters on this subject in the most recent German work, now in process of publication, *Deutsche Chirurgie*, *Lieferung* 37, by Dr. Max Schüller.

HISTORY OF THE OPERATION.—In 1829 Albers in Bonn performed the operation on dogs the first time, and in 1870, Vincenz Czerny concluded from further experiments on dogs, that the larynx of man could be successfully extirpated.

He published a method for the operation and constructed an artificial larynx. Three years after Czerny's experiment, Billroth performed the extirpation of the larynx, on a patient who was suffering with a carcinoma of the larynx which could not be removed otherwise. After the operation, the patient was provided with an artificial larynx from Gussenbauer, to enable him to speak. One year after the operation, the patient died of a recurrent carcinoma in the glands of the neck. After this in the year 1874, Heine at Prague, and Maas at Breslau, performed the extirpation of the larynx successfully; also Schmidt at Frankfort, and Schrenborn at Königsberg. Billroth operated the second time in 1874. In February 6, 1875, Bottini at Turin, performed the extirpation of the larynx to remove a sarcoma. The patient recovered and was well up to the end of 1878, performing the duties of a letter carrier.

The most complicated extirpation of the larynx was performed by Langenbeck, July 21, 1875. The patient was 57 years old and suffering from an extensive carcinoma. The larynx was extirpated and with it a group of lymphatic glands from the submaxillary region; also the os hyoides, a part of the tongue, a part of the pharynx and œsophagus; forty-one ligatures were applied; among other vessels, both external carotids, both linguals, both facials, and both superior thyroids were tied. The patient recovered, but four months after the operation a glandular *recidive* had to be removed, in consequence of which the patient died by collapse. In 1876 the extirpation of the larynx was performed by Maas, Gerdes and Reyher; in 1877 by Kosinsky, Bottini, Wegner, on the continent of Europe, and by Foulis at Glasgow. In 1878 Bruns, Czerny and Rubio in Spain, performed the extirpation of the larynx. Billroth removed in 1878 the left half of the larynx, the patient made a good recovery, and was able to speak without an artificial larynx.

INDICATIONS FOR THE OPERATION.—Carcinoma and sarcoma alone justify the extirpation of the larynx. Of 19 cases of laryngotomy performed for the removal of malignant growths in the larynx, only one case has been recorded as successful. In all the other 18 cases the disease has recurred shortly after the operation, on account of the difficulty of removing every particle of the growth.

OPERATIVE METHODS.—As a preliminary operation, tracheotomy should be performed some weeks, if possible, before the extirpation of the larynx is undertaken. The patient, by the tracheotomy, will be able to breathe better and to improve his general health; the danger of suffocation during the extirpation of the larynx will be avoided. Ether or chloroform has to be given, and to prevent the blood from running down the air passages, Trendelenburg's tampon-canula should be applied, or the patient be brought into Rose's position, with head hanging down.

The operation begins with a longitudinal incision from the os hyoides in the median line downward. In some cases, where more space is required, a transverse incision may be needed also. After the cutis and fascia are severed, the thyroid symphysis is exposed, and the sterno-hyoid muscles separated.

In the lower half of the median incision the crico-thyroid artery will be severed and have to be tied.

After this the larynx has to be isolated from the lateral soft parts, either by the knife or by some blunt instrument inserted beneath the deep fascia of the neck, previously divided in the middle line. By this method the thyro-hyoid muscles will be lifted, together with the aponeurotic investment of the lateral thyroid laminæ, where the thyro-hyoid and sterno-thyroid muscles are inserted.

By following up this method, and keeping both muscles connected, it is quite easy to separate the corresponding lobe of the thyroid gland, so that no large blood-vessels shall be encountered. The superior thyroid artery, with the thyro-hyoid muscle, will be pushed aside. Now the larynx is to be drawn aside by a hook, and the insertion of the constrictors of the pharynx separated with a knife from the thyroid cartilage. While the larynx is drawn to one side and the separated soft parts to the other, the superior laryngeal artery comes into view, and has to be tied twice.

The thyro-hyoid ligament is then transfixed and cut at the base of the epiglottis, from the middle line first to one and then to the other side.

In case the epiglottis is to be taken away *in toto*, the scalpel must have a direction more oblique and upward, the point of the knife being directed by the left index through the mouth.

The larynx will now be drawn forward and separated by the knife from the trachea.

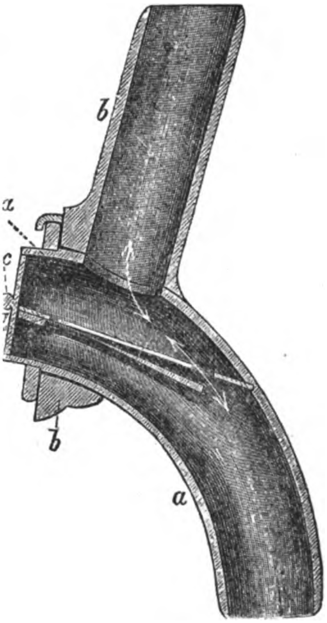


FIG. I. ARTIFICIAL LARYNX OF FOULIS, NATURAL SIZE.

a, *a*, Tracheal canula.
b, *b*, Laryngeal canula.
c, Plate with button carrying a metal frame with feathered metal tongue. *Schüller.*

After the extirpation of the larynx, the wound as well as the larynx has to be examined closely, to see if there is anything remaining of a malignant character. In such cases the galvano-cautery or the solution of chloride of zinc, 6 per cent. strong, has to be used freely,

AFTER-TREATMENT.—The wound should never be closed by sutures. Immediately after the performance of the extirpation and irrigation with strong carbolic acid solution, a tube should be introduced through the œsophagus into the stomach, and left there.

The wound ought to be dressed with cotton impregnated with carbolic or salicylic acid, by which the tube will be kept in its position. The dressing prevents the secretions from entering the trachea, and should be changed daily. The dressing ought to be done under the spray, and the air in the room ought to be disinfected constantly.

The tube through which liquid nourishment will be given should not be removed for some days. With the beginning of granulation the tube may be removed temporarily and its introduction through the mouth tried.

One or two weeks after the operation the patient will be able to take nourishment without the tube, and then another tube should be introduced in the site of the larynx to prepare a bed for the artificial larynx, which may be brought *in situ* about three weeks after the operation.

PROGNOSIS.—The results of the operation are encouraging: the patients of Bottini, Foulis and Czerny, who were suffering from sarcoma, are living and doing well. From 15 patients suffering with extensive carcinoma of the larynx who were operated upon, two only are living at present. Five died of pneumonia shortly after the operation; most of the others died later of recurrent carcinoma in the glands of the neck. The extirpation of the larynx will undoubtedly give better results when performed as soon as the diagnosis of carcinoma can be made.

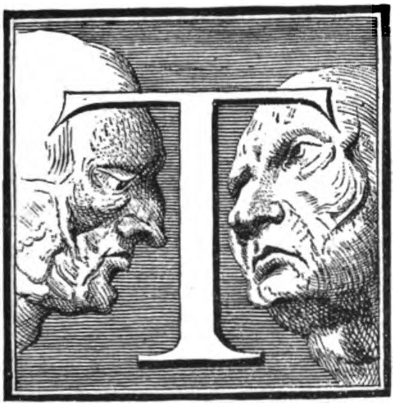
Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

VI. GASPARO TAGLIACOZIO.

1546–1599.



TAGLIACOZZI, Tagliacotius, or Taliacotius (for such are the several modes of spelling the name as we find it in different books), was born in Bologna in the year 1546, and died, when fifty and three years old, in the same city, November 7, 1599. Every student of surgery is familiar with his name, for no operation bearing a personal denomination can be better known than that of restoring the nose by the "Taliacotian, or Italian method."

Very few particulars relating to the life of this distinguished surgeon have been recorded. He was for many years a celebrated professor of anatomy and surgery in the renowned University of Bologna. His reputation was so great, and his name so intimately associated with rhinoplasty, of which art he was the restorer and champion, that soon after his death the magistracy of his native city honored his memory with a statue, which was placed in the anatomical theatre of the university; odd as the conceit may appear to us at the present time, Taliacotius is represented holding a nose in his hand! A very fitting emblem of his fame as a surgical noseologist.

From a remark of Galen (*Meth. Med.*, lib. xiv) it would appear that the making of noses was practiced by the priesthood of Egypt, though of their method, which was kept secret, nothing was known. Celsus is the earliest writer who has treated on "the mode of repairing the ears, lips and nose." The ninth chapter of his eighth book (*De Medicina*), written about the middle of the first century, is exclusively devoted to this subject, under the precise title above given in quotation marks. It was not, however, until about the middle of the fifteenth century that autoplasty, or rhinoplasty, took rank among surgical operations. All the medical and surgical writers from Celsus to this date are entirely silent upon this subject. Peter Ranzano, Bishop of Lucern, is the first who made mention of it in his *Annals of the World.* From him we learn that the Brancas, father and son, surgeons of Sicily, who lived in 1442, practiced this art with consummate skill. He states that Branca was "a man of great abilities, who had learned the art of restoring a nose, either by supplying it from the arm of the patient, or by infixing upon the part the nose of a slave."

Vincent Vianeus (or Vijanus, or Bojano, or Boiani), Bernard his nephew, and some of his descendants, were distinguished at Calabria during the sixteenth century in the art of supplying lips and noses. Alexander Benedictus, a Veronese, professor at Padua before 1495, is the first medical author extant who, since the revival of letters, has mentioned this operation of surgery. He also took the material from the patient's arm. He adds that these artificial noses badly endured a severe winter, and required care lest they be torn off. Vesalius, Fallopius, and Stephen Gourmelen (*Ars Chirurgia*, 1580), all treat more or less on this subject. Ambrose Paré (1561) says "there was a surgeon of Italy of late yeares" who performed this operation, and relates the following "history." "A young brother of the family of St. Thoan, being weary of a silver nose, which being artifically made, he had worn in the place of his nose that was cut off, went to this Chirurgeon into Italy, & by the means of the fore-named practice he recovered a nose of flesh againe, to the great admiration of all those that knew him before. This thing truly is possible to be done, but it is very difficult both to the patient suffering, and also to the Chirurgeon working."

Taliacotius perfected the art to a greater degree, and practiced it more extensively and skilfully than any of his predecessors, and what is still more important, wrote the first and only treatise on the subject, worthy of the title, to be found in the whole literature of surgery for a period of over two centuries. Our author had unbounded confidence in his favorite operation; he went so far as to assert that the grafted nose possessed a more acute sense of smell than a natural one.

It is a remarkable fact in the history of this subject, that after all that had been done and published, as above shown, the art of restoring the nose fell again into oblivion for nearly two hundred years, and, to such a degree, that less than a century ago many surgeons held it to be fabulous or, at least, impracticable.

This is not the place to describe the various methods of rhinoplasty; however, the story would be very incomplete unless a word should be said concerning the Hindoo or *Indian method*, which consists in furnishing the reparative material from the skin of the patient's forehead. This method eclipses all others in antiquity, as it had been practiced from time immemorial by certain castes in India, especially the Koomas or potters. It appears to have been unknown in Europe previous to the war with Tippoo Saib, in 1793, when the attention of British surgeons was called to it by the skill of the Indian priests in the reparation of the nose by this peculiar process. This method was introduced into Europe by Linn and Carpue of London, who operated themselves in 1813 and 1814; the latter gentleman published his two cases in 1816. It soon became the popular method, and quite took the precedence of the Taliacotian.

I will end this brief historical sketch of the ups and downs of rhinoplasty by a short account of the satire of Butler, in his Hudibras (part 1, canto 1, lines 280 to 286), in the following oft-quoted stanza:

> "So learn'd Taliacotius from
> The brawny part of porter's bum
> Cut supplemental noses, which,
> Would last as long as parent breech;
> But when the date of nock was out,
> Off dropp'd the sympathetic snout."

Now it appears that Butler did not know anything about this surgeon's mode of operating, but founded his ridicule on a story which Van Helmont, in his treatise *De Magnetica Vulnerum Naturali et Legitimâ Curatione*, to show the influence of sympathy, relates of a native of Brussels, who having lost his nose in battle, repaired to Taliacotius to have it restored. The patient dreading the necessary incisions, hired a porter to suffer the nose to be taken from his arm. About thirteen months afterward, as he was walking in Brussels, the nose suddenly became cold, and after a few days dropped off in a state of putrefaction

The cause of this unexpected event turned out to be that the porter died at Bologna at the same instant the nose grew cold. Dr. Fludd relates a similar case in his *Defence of Weapon Salve.*

It is needless to state that these stories are untrue. Notwithstanding that Irvyng, an English writer, testifies to the truth of Van Helmont's anecdote by asserting that he had "heard it from a doctor of physick, a friend of his, who did swear it deeply; that himself was an eye-witness of it."*

In Italy and also in India the the barbarous practice of cutting off the noses of criminals existed for an indefinite period of time. Sextus Quintus caused it to be practiced upon thieves and rogues. The king of Goorka inflicted the same upon the inhabitants of Kirtipoor, in order, he said, that he might recognize them everywhere, and to be able to apply to them the vile epithet of *Nascatapoör.* This practice has continued in the East down to the present day. After the recent battle between the Turks and Montenegrins, two hundred and sixty Turkish noses were cut off and sent to Prince Daniel, of Cetlinge. Various motives have led to self-mutilation by cutting off the nose. An abbess, with her forty nuns, did the same when the Saracens presented themselves at Marseilles. To these may be added accidents and other causes of destruction of the nose, all of which would seem to be sufficient to suggest the necessity and encourage the skill of surgeons to repair so great a loss.

Caspar, or Gaspard Taliacotius was the chief surgeon of the Grand Duke of Tuscany, to whom he dedicated his famous treatise on the restoration of noses, ears and lips with studied ostentation. The title runs thus: *De Curtorum Chirurgia per insitionem, libri duo. In quibus ea*

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* Medicina Magnetica; or the rare and wonderful Art of curing by Sympathy. C. de Iryngio, Chirurgo Medicine in the Armie, 1656.

omnia, quæ ad hujus Chirurgiæ, Narium sillices, Aurium, ac labiorum per insitionem restaurandorum cum Theoricen, tum Practicen pertinere videbantur, clarissima methodo cumulatissimè declarantur. Additis Cutis Traducis instrumentorum omnium, atque deligationum iconibus, and Tabulis. The twenty-two "Icons" are curious and interesting. "Icon tertia," exhibits on a full folio plate, a gentleman in knee-breeches, low shoes, etc., seated in a heavily-curtained room near an open-arched doorway, through which a view of the country is seen. The whole object of the engraving is to show that he has no nose and to indicate the spot on his left arm from whence the graft is to be taken with which it is to be repaired. So the pictures go on to the end of the series, showing the instruments used, the retentive apparatus, the steps and stages of the operations for restoring the nose, ears and lips. Some of the plates have from two to four figures each. In the first ten chapters of the first book the author brings all his learning to bear upon the subject of autoplastic operations, in illustration of which he has not only quoted medical writers, but poets, the fathers, and even the Scriptures, so that we have a motley collection of references to Homer, St. Augustine, Euripides, Horace, Tertullian, St. Gregory, Aristotle, Plutarch and the book of Genesis. Over twenty pages of index in double columns, exhibit the care of the author in minute and elaborate detail in the preparation of the work.

It is the delight of the medical bibliomaniac to possess himself with a copy of the first edition of this rare and curious work, which was published in folio, illustrated with twenty-two full-page wood engravings at Venice, 1597, being two years before the author's death. The second edition appeared in the following year in small octavo (it looks like a 12 mo.) at Frankfort, 1598. The third and last edition is in octavo with six plates in lithograph, edited by M. Troschel, Berlin, 1831.

EDITORIAL DEPARTMENT.

THE STOVER-CATLIN MALPRACTICE SUIT.

The recent suit for alleged malpractice in this city, brought against two of our most esteemed practitioners in a case of injury to the hip, was one of unusual importance to the medical profession. The physicians of Brooklyn feeling that their personal interests were in jeopardy watched the developments of the trial and awaited the verdict with anxiety. All rejoice that the failure of the prosecution has done much to discourage similar suits in the future. The amount and character of the expert testimony, the vexed and delicate surgical problems involved in the case, are of sufficient importance to merit further consideration and permanent record.

It appeared from the evidence that the plaintiff, a woman of 49 years, had fallen heavily, sustaining the blow chiefly upon one trochanter. She was attended shortly after the injury by Dr. J. L. H. Elmendorf in the temporary absence of Dr. A. W. Catlin for whom she had sent. On the following day and subsequently careful and repeated examinations were made by both gentlemen under the apprehension that the patient had sustained a fracture of the neck of the femur. No evidence was found of other injury than contusion and concussion of the structures about the hip. The injured extremity presented neither shortening, displacement, deformity, nor disability other than apparent loss of muscular power. Dr. Catlin attended the case for two weeks. During that period there was a progressive improvement in the patient's condition as manifested by abatement of pain and increasing control over the limb. At the expiration of that time the doctor discontinued his visits, prompted by the wishes of the patient to lighten the expense of treatment, but expecting to be advised should further occasion arise for surgical services. Meanwhile the patient, who had already begun to show a spirit of intolerance of restraint, had, without the knowledge of the doctor, been employing an electrician. After some time, impatient of the slowness of her recovery, and while still under treatment by the electrician, she summoned from another State a certain "natural bone-setter." The bone-setter, with the easy assurance of his class, made a positive diagnosis of fracture of the neck of the femur within the capsule. He declared that he could feel the ends of the fractured bone through the mass of overlying muscles and could appreciate their movements upon each other as he manipulated the limb. He assured the patient that had he been called earlier he would have restored the limb, but that, owing to the maltreatment she had received, the fracture had not united and she would be a cripple for life.

At the end of two months, the patient's condition having grown worse under the treatment of the electrician and the bone-setter, Dr. Daniel Ayres, a surgeon of eminence, was called to the case.

During his examination, as he believed, in grasping the trochanter with his hand and attempting to rotate the bone he elicited crepitus. He gave the patient an unqualified opinion that she was suffering from an ununited fracture of the neck of the femur. Having to leave town the next day, he transferred the case for treatment to his friend Dr. J. S. Wight the Professor of Surgery in the Long Island College Hospital. The professor upon taking charge of the case did not—as he testified—at any time so thoroughly examine it as to enable him to be positive that a fracture existed. He feared lest the manipulations necessary to fully establish the diagnosis might be injurious to his patient and he refrained from them, inasmuch as the general aspect of the case made him reasonably certain that it was one of fracture. He treated the patient after the accepted methods for fracture of the neck of the femur for some months and finally discharged her with a shortening of one-third of an inch and a hip joint professedly so weak that locomotion was difficult and painful, and was possible at all only with the aid of crutches.

At this stage of the case Dr. J. M. Carnochan, of New York, was consulted, who diagnosticated an united fracture of the neck of the femur. This opinion Dr. C. Olcott also concurred in. On the strength of these opinions, a suit for malpractice was commenced against the two surgeons who had originally treated the case and had pronounced it simply a contusion.

At the trial, in addition to the testimony of the defendants as to the original character of the injury and their treatment, Drs. Frank H. Hamilton, Henry B. Sands, Joseph C. Hutchison, George K. Smith and John G. Johnson, who as a commission appointed by the court had examined the plaintiff, testified that they had found no restrictions of the motions of the hip joint, no expansion or irregularity of the trochanter, no variation in its arc from that of the sound side, nor any sign whatever that a fracture had existed; a result the most successful on record if ever a fracture had been present. The data upon which the hypothesis of a fracture of the neck of the femur was founded, by those who testified to that opinion, as produced in the court, satisfied no surgeon who heard them that they were sufficient to establish even a probability of its presence, much less a conviction so strong as to warrant its assertion at the risk of imperilling the reputation and fortunes of their brethren. These data consisted in the supposed elicitation of crepitus in the ninth week, slight eversion of the foot, shortening of one third of an inch, and asserted pain on motion. These symptoms, the possibility of normal asymmetry of the limbs being now an established scientific fact, are as fully compatible with the theory of contusion as of fracture, while all the other facts of the case are entirely inconsistent with the theory of fracture.

The real case is this : a woman sustained a contusion of the hip ; not satisfied with the rapidity of her recovery under her original attendants she discharges them at the end of two weeks ; at the end of two years, despite the stimulants of an electrician, the manifestation of a bone-setter, and the prolonged confinement with limb splinted and extended as for a fracture of the neck of femur, she has not recovered full power over her contused muscles ; therefore the two original attendants are to be held responsible for the result. In such a trial every surgeon who has had or is likely to have a contused muscle or an overstretched ligament to treat is a party to the defense. It is a matter of congratulation for humanity's sake, as well as for science that neither the ability of counsel, nor the well-managed displays of apparent suffering, and disability by the prosecutrix were able to secure a verdict against the surgeons.

THE CLINIC.

Tracheotomy.—Membranous Croup—Recovery. **Maddren.** Cora C., seven and one-half years; has had progressive symptoms of croup since February 8th. Treatment turpeth mineral and vapor from slaking lime; no pharyngeal deposit. February 28th, dyspnœa, cyanosis and laryngeal obstruction. Tracheotomy below isthmus of thyroid, assisted by Dr. I. H, Barber. Hemorrhage sharp; arrested by introduction of tube; relief to dyspnœa only partial. February 29th, cast of trachea expelled through outer tube with great relief to respiration. Steady improvement till March 6th, when measles developed. March 10th, tube permanently removed. March 11th, lobar pneumonia in left lung followed by complete solidification; cyanosis marked; rectal alimentation for next week; quinine and stimulants. April 7th, tracheal fistula closed. April 26th, recovery complete.

Tracheotomy.—Diphtheritic Croup—Recovery. N. **Matson.** E. M., three and one-half years, has been ill six days with diphtheria. March 31st, pharyngeal exudates have disappeared but dyspnœa and tracheal stenosis render operation imperative. Dr. H. F. Williams operated, but respiration at once ceased. Breathing reëstablished by artificial respiration, and brandy subcutaneously; Benzoate of soda used in spray until convalescence. In four hours a cast of tracheal origin removed with tube; another similar piece soon after. April 2d, pulse 130, T. 37.7, C. Resp. 30, great dyspnœa; tube removed; no relief. Dr. Williams removed a cast with forceps, showing bronchial bifurcation. Several large shreds expelled soon after. April 3d, severe bronchitis. April 11th, strychnia administered and continued till convalescence. April 14th and 20th, albumen found in the urine; pulse irregular and intermittent (80-148) during progress of case. Stimulants or food given *hourly* during first two weeks. Tube permanently removed on 13th day. Recovery now assured.

Mammary Cyst.—J. **Byrne**, St. Mary's Hospital, Brooklyn. Recovery. Widow, æt. fifty years; had abscess of right breast twenty-seven years ago. Present tumor appeared twelve months ago and has increased rapidly. February 28, 1880, measured 28.5 centimetres in circumference and 20 centimetres over most prominent portions of growth. Removal attempted by enucleation. During operation cyst wall ruptured and a large quantity of a dark-brown fluid escaped. Tumor proved to be a unilocular cyst. A portion of its walls was left attached to ribs, the muscular structures beneath having entirely disappeared. Reaction sharp; high temperatures for a day or two. March 31st, patient doing well; wound almost closed; has since recovered completely.

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ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

ON PERITYPHLITIS.*

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SINCE the year 1867, when Dr. Willard Parker happily advocated and adopted the plan of treating perityphlitic abscess by early incision, the procedure has received considerable attention from American surgeons, and the practice recommended by Dr. Parker has been fully endorsed by all who have published the results of their experience. That the disease, however, although by no means uncommon, is frequently overlooked or misunderstood, seems quite certain; and what is known about it has not yet been embodied in the standard surgical text-books, but remains scattered among the pages of our current medical literature. Further discussion of the subject is therefore desirable, in order that the disease may be readily recognized and submitted to appropriate surgical treatment; and in order that those cases in which operative interference is necessary may be, if possible, distinguished from others, not infrequent, which tend to spontaneous recovery, or which, at least, are likely to terminate favorably without the aid of the knife. My object in the present communication is briefly to present to the Society the results of my own observation of this affection, in the hope of eliciting profitable discussion, and of obtaining such additional information derived from the personal experience of my colleagues as shall throw light upon several obscure and unsettled points connected with its pathology and treatment. My remarks will refer only to those cases of inflammation in the neighborhood of the cæcum, in which the disease is circumscribed; as those in which general peritonitis rapidly follows a perforation of the cæcum or the vermiform appendix belong to a separate category, and, terminating fatally, are as yet beyond the reach of art, and possess therefore a pathological rather than a surgical interest.

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* Delivered before the Society May 31, 1880.

Thus defined, twenty-six cases of perityphlitis have fallen under my notice. Of these, twenty-two were observed in males and four in females, thus confirming the fact already established concerning the comparative rarity of this disease in the female sex. Of the entire number, only one occurred in hospital practice. The youngest patient was nine years of age, and the oldest fifty-four. Of the rest, ten were between ten and twenty, seven between twenty and thirty, two between thirty and forty, and five between forty and fifty.

As is well known, various causes have been assigned by systematic writers for the occurrence of the inflammatory affection under consideration, and a pathological classification of the cases I have seen would doubtless be preferable to any other, provided it could be accurately made. But as in all, except three of them, the disease terminated in recovery, the precise pathological condition could rarely be determined; and therefore I have thought it more profitable to separate the cases into four divisions, as follows:

1. Cases terminating in resolution, without evidence of suppuration.

2. Cases of abscess, terminating in spontaneous recovery.

3. Cases of abscess, treated by operation.

4. Cases of abscess, unopened, and ending fatally.

The first group comprises ten cases, in all of which the disease disappeared without showing any signs of suppuration. Inasmuch as many persons entertain the erroneous notion that perityphlitis, when once established, must necessarily terminate in the formation of abscess, it will be important to dwell on these cases long enough to show that their diagnosis was carefully and fairly made out. In all the following symptoms were present, namely: abdominal pain and tenderness, usually occurring suddenly, sometimes limited to and always most marked in the region of the cæcum; fever, indicated by an acceleration of pulse and a rise of temperature; and the presence of an indurated swelling, distinguishable either by palpation in the right iliac fossa or by digital exploration of the rectum. In most of the cases, the onset of the disease was severe, being characterized by nausea and vomiting, and by acute pain and tenderness in the cæcal region. Sometimes the pain in the abdomen was diffused in the beginning, and became localized only on the second or third day. The temperature was elevated in every case, ranging from 100° to 104° F., in one case reaching 105°. The most striking feature of the disease, namely, the presence of a circumscribed induration in the right iliac fossa, was observed in nine out of the ten cases belonging to this group; while, in the remaining case, the inflammatory swelling could be distinctly felt through the rectum, the finger detecting a firm elastic mass, tender to the touch, and evidently developed from the region of the caput coli. When present in the iliac fossa, the tumor seemed deep-seated, and was invariably situated above and within a short distance of Poupart's ligament. Its external margin often advanced to a point within an inch of the anterior spinous process of the ilium, while, internally, it seldom reached the median line, in one instance, however, passing two inches beyond it. Its upper limit rarely extended above the cæcum or adjacent part of the ascending colon. In all instances the tumor was deep-seated, immovable, and tender on pressure; and in several the abdominal wall covering the tumor anteriorly was so exceedingly painful to the touch as to render a thorough examination quite difficult. The induration was usually discovered within forty-eight hours after the commencement of the disease, and generally began to subside soon after the abatement of the other symptoms.

It is worthy of notice, however, that in almost all cases the subsidence of the tumor was gradual, and that in one instance nearly five months elapsed before the disappearance was complete. This fact, coupled with the circumstance that care was always taken to secure a thorough action of the bowels by the administration of purgatives, clearly indicates the inflammatory nature of the tumefaction, and forbids the supposition of the latter being directly due to fæcal impaction in the cæcum. In one exceedingly chronic case, in which the disease lasted for several months, an accumulation of hardened fæces in the cæcum and colon seemed evidently the origin of the inflammatory mischief, which continued, however, long after the exciting cause had been removed. So far as the early symptoms are concerned, these cases could not be distinguished from those that were destined to go on to suppuration. The abdominal pain, the fever, and the gastric disturbance were quite as severe, and the indurated mass occupying the iliac fossa presented the same characters. I have therefore learned to decline, in the beginning of the disease, to express a definite opinion as to the probable ultimate result, since time alone can decide whether the inflammatory process shall be arrested, or advance to the stage of suppuration. Fortunately, the doubt is often solved at an early period, for I ascertain from my notes that in five out of the ten cases resolution occurred as early as the fifth, and not later than the eighth day; while in only one case was it delayed beyond the fourteenth day. The favorable termination was indicated by a decided fall in the pulse and temperature, the latter sometimes dropping below the normal standard, and by a marked diminution of abdominal tenderness, pain and distension. These signs of improvement generally coincide with a decrease of the local tumefaction, traces of which, however, as has been mentioned, often remained long after the estabment of convalescence. In a few instances the tumor subsided so rapidly as to suggest that an abscess had ruptured, although a careful inspection of the urine and fæces failed to detect admixture of either blood or pus.

Regarding the pathology of the cases now referred to, nothing very definite can be stated. In one case, impaction of fæces in the cæcum seemed a probable cause; in another, the disease came on after unusual muscular exertion; while in a third, it may have been due to some intestinal lesion accompanying continued fever. In the remaining seven cases, no adequate cause could be discovered. In all, however, the symptoms pointed to plastic inflammation of the connective tissue adjacent to the cæcum as the proximate cause of the characteristic induration which, with a single exception, was found in the iliac fossa. In this exceptional case, in which the inflammatory swelling could be felt only through the rectum, it may be conjectured that the irritation proceeded directly from the vermiform appendix which, instead of being curled up behind the cæcum, lay at, or below the level of the brim of the pelvis. What proportion of cases were connected with the lodgment of fæcal concretions or foreign bodies in the vermiform appendix cannot, of course, be determined; but it should be remembered that this morbid condition is the most frequent cause of perityphlitis when the disease culminates in abscess, and that in many of the latter class of cases, there is obtained a history of one or more preceding attacks of a similar character, terminating by resolution. The invariable occurrence of such disease on the right side can be explained only by reference to the cæcum or its appendix as the starting point; and pathological anatomy has demonstrated that lesions of the appendix are relatively more frequent, as well as more dangerous, than those of the cæcum itself.

The treatment of the cases which terminated in resolution consisted mainly in local depletion, the application of fomentations or poultices to the abdomen, and the internal administration of opium. Eight or ten leeches were usually applied over the cæcal region, and sometimes the leeching was repeated. The effect was often markedly beneficial. Opium or morphia was given in moderate doses, sufficient to allay pain, but never so as to induce narcotism. Castor oil, fluid extract of senna, or calomel was administered in nearly all cases early in the disease, and I would remark that this practice appears to be judicious for two reasons: first, to afford aid in diagnosis, by excluding fæcal impaction in the cæcum as a possible cause of the symptoms; and secondly, because any accumulation of fæces in the intestines increases the patient's suffering, and is doubtless liable to aggravate the existing inflammatory mischief. The propriety of using cathartics in this affection has been often doubted, and we are taught by some that here, as in the case of general peritonitis, they should be absolutely withheld. But the analogy between the two diseases is not very close, and experience has shown that the fear which has been expressed concerning the danger of cathartics in perityphlitis is unreasonable. Nothing can be gained, however, by their repeated administration; a single purgative, given in the beginning of the disease, will generally suffice to empty the bowels, while subsequent accumulation can be obviated by careful restriction of the diet, and by the selection of light, nutritious articles of food. The treatment thus briefly outlined has been occasionally supplemented by the use of blisters and mercurial applications, whenever the absorption of the inflammatory products appeared to be unduly retarded.

The recognition of the class of cases first described is important, on account of the erroneous opinion widely entertained, that perityphlitis, when once established, must necessarily proceed to suppuration. While this may, perhaps, be true when the disease is due to perforation of the intestine, with the consequent escape of its contents into the surrounding tissues, it is quite exceptional in those cases which owe their origin to the mere presence of hard and indigestible substances in the cæcum or its appendix, to the extension of catarrhal processes in the cæcum through the intestinal coats, to the effects of injury, or to causes which, with our present lack of knowledge, we are unable to define, but yet cannot refuse to acknowledge. Such cases, tending to recovery without suppuration are, as my own experience proves, by no means rare, and their relative frequency is doubtless greater than my figures would seem to indicate, inasmuch as the surgeon is apt to witness the severer, rather than the milder examples of the disease. Since many of them terminate favorably before the end of the first week, the question of the propriety of surgical intervention will often not arise, but when resolution is deferred to the tenth, twelfth or fourteenth day, or even later, it will often require nice judgment to decide whether to operate or not, especially as the surgeon is taught, in doubtful cases, to resort to the knife without waiting to detect fluctuation, and not to delay the incision much beyond the first week of the disease. It must be evident, however, that the question of operation is one that cannot be settled by time alone, and that all the circumstances of the case should be carefully considered before resorting to a procedure which may be needless and possibly hazardous. This subject naturally leads to the study of the cases forming the second group, namely, those of abscess terminating in spontaneous recovery.

I have already remarked that in several cases included in the first series, the subsidence of the local swelling took place so rapidly that it was hard to believe an abscess had not ruptured and emptied its contents into some neighboring hollow viscus. But as an examination of the urine and fæces afforded no evidence in support of such a view, the question was necessarily left in doubt. In three instances, however, my notes furnish conclusive proof that such an event may happen and that it may be followed by complete and speedy recovery. Many years ago I attended a lady afflicted with an abscess in the cæcal region, which, at the end of the second week, was accompanied with alarming symptoms of general peritonitis. Suddenly a large quantity of pus was discharged at stool, and the patient, whose condition had hitherto seemed desperate, became immediately convalescent. In the year 1876, I saw, in consultation with Dr. Pierson, of Orange, a girl nine years of age, who had suffered during the previous eight days with the usual symptoms of perityphlitis. At the time of my visit I discovered a non-fluctuating, tender swelling in the iliac fossa. The severity of the general symptoms as well as the abdominal pain and distension led me to suspect the existence of an abscess, which I succeeded in demonstrating by employing the hypodermic syringe as an aspirator and withdrawing a small quantity of pus. I paid a second visit to the patient on the following day, intending to open the abscess in the usual manner, but found, on my arrival, that the tumor had almost entirely disappeared. I was informed that during the preceding night the child had grown rapidly worse and complained of intense pain in the region of the bladder. Soon afterward she voided a very large quantity of urine, and then at once became quiet and free from pain. Unluckily, the nurse threw away the urine without examining it, but we inferred that the abscess had ruptured into the bladder. In any case, it must have discharged its contents at the time stated, for on the following morning the tumor could hardly be felt, the pulse and temperature had declined to the natural standard, abdominal pain and distension had disappeared, and the patient had evidently passed the crisis. The third case I saw last year in consultation with Dr. M. R. Vedder. The patient was a girl thirteen years old, who had been attacked with perityphlitis a week previously. I found the usual tumor well marked in the iliac fossa, and also unusually prominent in the rectum. A purgative was prescribed which acted freely, and on the ninth day of the disease the swelling almost disappeared, and the fæcal evacuations, on being examined, were seen to contain a notable quantity of blood and pus. In this case the abscess probably broke into the rectum, and, as in the two other instances just related, the patient speedily regained her health.

These three cases prove that even when a perityphlitic abscess is left to itself, its course is not always unfavorable, but that its contents may be discharged into the intestine or possibly into the bladder, without any serious consequences. Indeed, it would appear that this mode of termination is adapted to secure the best possible result, for convalescence begins as soon as the abscess has ruptured, whereas, after an external opening has been established either naturally or by incision, the suppuration is always more or less protracted and the cure correspondingly retarded. Unfortunately we are unable, in any given case, to predict this result, which, moreover, is so exceptional in its occurrence that it does not invalidate the rule of affording vent to the matter by an external incision, so soon as the diagnosis of abscess is reasonably sure.

Cases of abscess treated by operation. This group contains eleven cases, the study of which reveals many interesting facts. The characteristic tumor in the iliac region was present in all the cases, but in only two was any swelling discoverable on digital exploration of the rectum. In four instances there was fluctuation. In one of these the date of operation was not recorded, but it was late in the disease, and the integument was extensively undermined, nevertheless the patient recovered. In the three remaining cases the abscess was opened on the fifteenth day, the seventeenth day, and at the end of the ninth week, respectively. The last named case, in which the operation was so long delayed, terminated fatally by septicæmia. At an earlier stage of the disease, and before fluctuation was evident, I proposed an exploratory incision, but the patient refused to submit to it. When, at last, the abscess pointed over the middle of the crest of the ilium, it had already burrowed extensively and acquired extraordinary dimensions. After being opened it continued to discharge very copiously, and, in spite of the employment of antiseptic injections, septicæmia occurred and carried off the patient. The case is instructive as illustrating the danger of delay, for it is the only one out of the entire number embraced in the present group in which death followed the operation. Had the abscess been opened at an earlier period, a fatal termination would probably have been averted.

In the remaining seven cases that were treated by incision, fluctuation was absent, and there does not appear to have been any one symptom indicating that suppuration had taken place. Yet in only one instance did the knife fail to penetrate an abscess, a circumstance which shows that the diagnosis can be made out with tolerable certainty, even when demonstrative evidence is wanting. Rigor, sweating, high temperature, acceleration of pulse, abdominal pain and tympanites, and an increasing extent combined with diminishing firmness of the abdominal tumor, are the chief signs which indicate the formation of pus. But none of these signs is invariably present, and it would be a difficult matter to say which one of them is the most important. But although in the early stage of the disease it may be impossible to discriminate between the cases that are going to terminate by resolution and those that are to end in suppuration, the latter may usually be distinguished toward the close of the second week by the generally unfavorable condition of the patient, who seems to be growing worse instead of better: whereas, when resolution is about to take place, the later course of the disease is comparatively mild and favorable. In one remarkable case already mentioned, wherein the affection continued for many months and ended without suppuration, the combination of symptoms was never such as to demand surgical interference, although on two occasions I was nearly persuaded to undertake an exploratory operation.

The seven cases now under consideration were treated by incision as follows: one on the ninth day, two on the twelfth day, one on the thirteenth day, and two on the twenty-first day. In all cases except the first, the abscess was found and opened. In the one in which the incision was made on the ninth day, no abscess could be discovered, although the knife was carried through the fascia transversalis, and the hypodermic needle thrust in various directions in the hope of finding pus. After the operation the patient grew worse, and his life was despaired of, when, eleven days later, an abscess broke and discharged its contents through the wound. Perhaps, in this instance, the operation was serviceable by dividing dense structures which might have offered resistance to the progress of matter toward the external surface, but it would, of course, have been more gratifying if an abscess had been reached at once. Usually a perityphlitic abscess remains of moderate size until about the end of the second week, and by deferring an operation until it is ripe, we shall find the deeper textures consolidated and agglutinated by plastic lymph, and, therefore, less liable to be infiltrated by the fetid discharges which, after incision, often cause more or less sloughing of the margins of the wound. On the other hand, the danger that the abscess, if unrelieved, may rupture into the peritoneal sac must not be forgotten. Through the kindness of Dr. Wiener I have the opportunity of showing to the Society a specimen illustrating this unfortunate accident. On Tuesday last, Dr. Wiener was called to see a gentleman who had been ill for six days with perityphlitis. The characteristic tumor was present in the iliac fossa, and the case being regarded as one of abscess, arrangements were made to open the latter on the following day. During the night, however, in consequence, it is supposed, of some incautious movement made by the patient, rupture into the peritoneum took place, and death ensued ten days afterward. The bursting of the abscess was indicated by a disappearance of the tumor and by collapse, followed by the usual symptoms of acute peritonitis. I believe such an event as this is very rare, but the possibility of its occurrence must make us watchful and anxious until the crisis is past. Everything depends on an exact diagnosis and on an early recognition and treatment of existing abscess, and I would suggest a more frequent employment of the aspirator as affording the most reliable test at our command for purposes of diagnosis. The smallest needle will suffice, and can be repeatedly inserted if necessary without doing harm. By means of this instrument the situation, as well as the presence of an abscess, can be determined, and it is well known that these collections of matter do not always occupy the same locality.

In every case that has fallen under my observation, the operation has been performed essentially in the manner recommended by Dr. Parker. An incision several inches in length, and usually parallel with Poupart's ligament, was made over the most prominent part of the tumor, through the skin and sub-cutaneous fat. Subsequently the deeper layers were divided until the abscess was reached, or until the fascia transversalis came into view. If fluctuation then became evident, the abscess was immediately opened, otherwise the fascia was penetrated in various directions by means of a hypodermic syringe until the seat of the abscess was discovered, when the operation was completed by entering a narrow bistoury alongside of the needle. I have no doubt that this method of operation, wherein the aponeurotic and muscular layers composing the abdominal wall are successively and cautiously divided is better than the plan which has been proposed of plunging a bistoury directly into the abscess and then enlarging the wound as the knife is withdrawn. Such a course can only be proper when fluctuation is present, and the matter lies near the surface. Nevertheless I would avoid the extensive incisions which are sometimes recommended, and which have been known to be followed by hernial protrusion. An external incision of two inches will afford ample space; and the wound should grow narrower as it increases in depth, while the direct opening into the abscess need not be larger than will readily admit the forefinger. This I think it desirable to insert, in order to ascertain the extent of the cavity, and to detect, if possible, the presence of foreign bodies or fæcal concretions. When these are found, they should always be removed; otherwise they may cause future trouble. In a case which I treated by incision several years ago, the patient did well after the operation, and returned to his work. About a month later, however, suppuration recurred, the wounds re-opened, and allowed the escape of a small fæcal concretion, the discharge of which was followed by a permanent cure.

Concretions were found in four out of the eleven cases treated by incision. One of them was large, and resembled in size and shape a date pit; the others were small, and, like the large one, consisted of inspissated fæcal matter, arranged in the form of concentric laminæ. One of them contained a few raspberry seeds, and in one instance, eight concretions, evidently formed in the appendix, were obtained from a single patient. Probably similar formations existed in other cases, but were overlooked and thrown away with the discharges. The contents of the abscesses were always exceedingly fetid, had a fæcal odor, and were more or less gaseous, rendering it probable that the intestine had been perforated. It is not a little remarkable that these perforations of the intestine, evident in some instances, and probable in all, invariably closed, for in no case did a fistulous track remain as a sequel of the operation. In the earlier cases the abscesses were kept clean by daily injections of tepid water; in the later ones a drainage tube was inserted and the injection made antiseptic by the admixture of carbolic acid.

My notes contain several cases in which perityphlitis occurred more than once in the same patient. In one of these the second attack, which terminated by resolution, took place thirteen months after a successful operation for abscess. No concretion or foreign body was found at the time when the abscess was opened, and it is possible that the retention of some such extraneous substance may have caused the subsequent trouble. This supposition is favored by the history of two other cases given in the table, in one of which there had occurred within a period of two years no fewer than three attacks of perityphlitis, the last one only ending in abscess. In the other patient an abscess formed two and a half years after a sharp attack of perityphlitis, terminating in resolution. In both, fæcal concretions were discharged from the abscess; and it is fair to presume that these had been the cause of the previous attacks. Such cases teach us that we should be guarded when giving a prognosis respecting the liability to a recurrence of the disease, after recovery has taken place by resolution. If the appendix contains a concretion, this will probably excite renewed irritation until the offending substance is discharged by suppuration.

In opening perityphlitic abscesses, in which fluctuation could not be detected, I have always proceeded with caution, for fear of wounding the peritoneum or the intestine; but I am doubtful whether such caution is absolutely necessary. Whether in consequence of the fact that these abscesses contain gas, or because they are adjacent to the intestine, they often yield a tympanitic sound on percussion, giving one the impression that the intestine is close at hand. But I have never observed this to be the case on opening the abscess, which is frequently so large that the forefinger inserted into it can barely touch the cæcum, displaced from its normal situation toward the median line.

It is generally assumed that when abscess results from perforation of the appendix, the matter is contained in the peritoneal sac, a portion of which is shut off from the rest by adhesions between the intestines, the parietal peritoneum, or the omentum. That the abscess may be thus constituted I am well aware; but I believe that such a mode of origin is quite exceptional, and that when, in consequence of intestinal perforation fæcal matters escape directly into the peritoneal cavity, the result is almost invariably a diffused septic inflammation of the peritoneum, ending in speedy death. Pathological anatomy has shown the possibility of another mode of abscess-formation, which I believe to be far more common. The vermiform appendix, before becoming perforated, may contract adhesions to the peritoneum lining the iliac fossa, on which it usually rests. Consequently, when the coats of the appendix have been destroyed, the ulceration extends through the opposed layer of peritoneum in such a manner, that the fæcal matters, instead of entering the serous sac, gradually pass into the loose connective tissue which lies outside the peritoneum, and there set up suppurative inflammation. The pus, as it accumulates, may burrow behind the cæcum and ascending colon; or it may descend behind the peritoneum into the pelvis; or, as most often happens, it may occupy more or less completely the iliac fossa. In the latter case, the serous membrane, which is here very loosely adherent to the iliac fascia, will be detached and deflected toward the median line, carrying with it, in the same direction, the cæcum and the small intestine. Here there will be little danger of wounding the peritoneum while opening the abscess, provided the operator avoids the upper and inner margins of the tumor, where the serous membrane forming the boundary of the abscess is reflected upon the anterior abdominal wall. Of course, in the event of an erroneous diagnosis, grave accidents might occur, for an incision which, in the case of abscess, would simply enter the suppurating cavity, might otherwise penetrate the peritoneal sac, and perhaps also involve the intestine. The aspirator offers, as has been stated, the best safeguard against such a blunder, and should invariably be employed in doubtful cases.

I have but a few words to add concerning the fourth and last group of cases, those in which the abscess terminated fatally, without discharging its contents either internally or externally. This group comprises only two cases, both of which possess features of interest. One of them I saw six years ago, in consultation with Dr. Smith Ely, of Newburgh. The patient was a gentleman forty-eight years of age, who after having suffered for some time with the symptoms of inflammation in the region of the cæcum, was seized with general peritonitis. At the time when he came under my observation, I found the abdomen greatly distended, but could discover no tumor in the iliac fossa or in the rectum. He declined to submit to the usual exploratory operation, but allowed me to cut through the skin and the thick subcutaneous fat, and to insert the needle of a hypodermic syringe into the deeper tissues. This was done with a negative result. Death occurred from peritonitis, and a post-mortem examination revealed an extensive abscess behind the cæcum and ascending colon, reaching as high as the under surface of the liver, and communicating with the intestine through an ulcerated opening in the posterior wall of the cæcum. The abscess was filled with pus and blood, and did not open into the peritoneum. The vermiform appendix was intact. This case, as well as the one I am about to relate, shows that a perityphlitic abscess may be situated altogether behind the colon, and suggests the propriety of inserting an aspirating needle through the posterior wall of the abdomen, when the symptoms of perityphlitis are present without the development of the usual iliac swelling.

Should matter be found, it could then be evacuated by an incision like that usually made in the operation of colotomy.

The second patient, a gentleman forty years of age, I saw in consultation with Drs. Rodenstein and Otis. The history of the disease pointed clearly to perityphlitis, but there was no tumor. Digital exploration of the rectum failed to discover any swelling, but detected slight tenderness high up on the right side. On the fourth day the patient became somewhat delirious, and on the sixth day he had a convulsion. From that time until his death, which took place on the sixteenth day, the symptoms were those of cerebral inflammation, the patient dying comatose. A *post-mortem* examination discovered the changes in the brain characteristic of purulent meningitis; and the disease in this case seemed to be pyæmic, for, on opening the abdomen, an abscess containing eight ounces of fetid pus was found situated in the lumbar region, behind the cæcum and ascending colon. The abscess communicated with the vermiform appendix, which was the seat of a double perforation. No tumor existed in the iliac fossa. There were no evidences of peritonitis except the presence of some adhesions connected with the appendix.

The early supervention, in this case, of acute cerebral inflammation would have prevented the success of any surgical operation, even had the situation of the abscess been known during life. But the case is instructive as showing that a perforating ulcer of the appendix, like a similar ulcer in the back of the cæcum, may give rise to an abscess in the lumbar region that cannot be discovered by the ordinary method of examination.

TABULATED SYNOPSIS OF TWENTY-SIX CASES OF PERITYPHLITIS.

By PROF. HENRY B. SANDS, M. D.

	Sex and Age.	Physical Signs.	Operation.	Result.	Remarks.
1	F., 45. 1864.	Tumor in region of Cæcum; great abdominal swelling and pain; no fluctuation.	None.	Recovered.	After alarming symptoms of general peritonitis, abscess opened into intestine about 14th day.
2	M., 20. Seen with Dr. Ball, 1870.	Fluctuating tumor in cæcal region.	Free incision, giving vent to much gas and fetid pus.	Recovered.	Case not seen until late. Integument extensively undermined.
3	M., 18. Seen with Dr. Parker, 1868.	Symptoms, sub-acute; tumor felt externally and per rectum.	None.	Recovered.	Disease was thought to be due to a sprain, the attack coming on after unusual exertion. Resolution occurred about 10th day.
4	M., 15. Seen with Dr. T. G. Thomas, 1868.	Tumor in iliac fossa, and very prominent in rectum.	None.	Recovered.	Attack occurred while convalescent from continued fever. Puncture of tumor in rectum was contemplated but not performed. Resolution.
5	M., 41. Seen with Dr. Ball, 1874.	Tumor in iliac fossa; no fluctuation.	Incision on 12th day.	Recovered.	Rigor with sudden increase in size of swelling occurred on 11th day. Eight small fæcal concretions discharged after operation.

6	M., 13. Seen with Drs. Leaming and White, 1874.	Tumor in iliac and lumbar regions; no fluctuation.	Incision at end of 3d week.	Recovered.	Tumor much higher than usual. Incision made near outer border of rectus.
7	M., 26. Seen with Drs. White and Crane, 1874.	Large fluctuating swelling in iliac fossa; great abdominal distension.	Aspiration 9th and 11th day. Incision by Dr. Crane on 15th day.	Recovered.	Patient has had two previous attacks within past two years; both terminated apparently without suppuration, but left an indurated mass in iliac fossa. Abscess discharged fetid pus and a large fæcal concretion resembling a date pit.
8	M., 25. Seen with Dr. J. C. Thomas, 1874.	Large tumor, extending from Pouparts' ligament to free border of ribs, and to left of median line.	None.	Recovered.	Disease exceedingly chronic, lasting from December to May, and terminating in resolution. Fæcal impaction in caput coli the probable cause of inflammation.
9	M., 48. Seen with Dr. Ely, of Newburgh, 1874.	General peritonitis; no tumor, but clear history of perityphlitis.	Incision down to opening of external oblique; then puncture with hypodermic syringe; no matter found.	Death.	Autopsy showed general peritonitis, and a large abscess behind the caecum and ascending colon, bounded above by the liver. Abscess communicated with intestine through a perforation in the cæcum. Vermiform appendix intact.
10	F., 14. Seen with Dr. Ball, 1876.	Tumor in cæcal region; no fluctuation.	None.	Recovered.	Attack acute. Temp. 102–105. Convalescent on 7th day.
11	M., 36. Seen with Dr. Ball, 1876.	Tumor in iliac fossa; no fluctuation.	None.	Recovered.	Acute symptoms disappeared at end of second week. Some induration remained for two months.
12	M., 18. Seen with Dr. Nicoll, 1876.	Indurated tumor in iliac fossa.	None.	Recovered.	Symptoms acute. Resolution on 8th day.
13	M., 40. Seen with Dr. Raub, Chester, N. J., 1876.	Non-fluctuating tumor in iliac fossa and in lumbar region anteriorly. Case first seen six weeks after attack.	Incision by Dr. Raub when abscess pointed over middle of iliac crest, nine weeks after commencement of disease.	Died of Septicæmia eleven weeks after operation.	When first seen, six weeks after commencement of disease, patient refused to allow operation; when opened, abscess was very large, and continued to discharge much fetid pus.

14	F., 10. Seen 1876 with Dr. Pierson, Orange, N. J.	Tender swelling in iliac fossa; no fluctuation.	Presence of matter determined by aspiration on 8th day.	Recovered.	Tumor suddenly collapsed on 9th day. Abscess probably ruptured into bladder.
15	F., 20. Seen with Dr. Draper, 1876.	Tumor in iliac fossa and in rectum; no fluctuation.	None.	Recovered.	Attack acute; rigors and sweating on 6th and 7th days, then subsidence of swelling, apparently without rupture. During convalescence suffered from thrombosis of left ext. iliac vein. A year later was attacked a second time with perityphlitis, again terminating by resolution.
16	M., 54. Seen with Dr. D. M. Stimson, 1877.	Tumor in iliac fossa and in rectum; no fluctuation.	On 9th day, incision by Dr. Stimson down to subperitoneal fat.; no abscess discovered.	Recovered.	Patient became worse after operation, until, eleven days afterward, abscess broke into wound, affording immediate relief.
17	M., 21. Seen with Dr. J. W. Howe, 1877.	Non-fluctuating tumor in iliac fossa.	Incision by Dr. Howe at end of 3rd week.	Recovered.	Tumor deep-seated, and not discoverable until eight days before operation. Thirteen months later patient had a second attack, mild in character, and ending in resolution.
18	M., 11. Seen with Dr. Vedder, 1877.	Usual tumor in iliac fossa; nothing felt per rectum; no fluctuation.	Incision on 12th day.	Recovered.	Abscess discharged small lump of fæces, containing three raspberry seeds.
19	M., 40. Seen with Drs. Rodenstein and Otis, 1877.	No tumor; finger in rectum detected tender spot high up in right side.	None.	Died on 16th day.	Secondary meningitis, (pyæmia) set in on 6th day. Autopsy showed purulent effusion beneath arachnoid; also abscess containing eight oz. of fetid pus, situated behind cæcum and ascending colon. Vermiform appendix perforated in two places.
20	M., 23. New York Hospital, 1877.	Tumor in iliac fossa, fluctuating at outer margin of rectus.	Incision on 17th day.	Recovered.	Patient had had attack of "peritonitis" 2½ years previously. Abscess re-opened four weeks after operation and discharged a hard fæcal concretion.

21	M., 9. Seen with Dr. Ball, 1877.	Non-fluctuating tumor in iliac fossa, and in rectum.	Incision on 13th day.	Recovered.	Attack acute with symptoms of general peritonitis. Tumor developed on 3d day. Temp. never above 101, and normal for three days before operation.
22	M., 32. Seen with Dr. Ball, 1878.	Hard, tender swelling in iliac fossa and along ascending colon.	None.	Recovered.	Attack acute. Temp. ran to 103$\frac{3}{5}$ on 4th day. Symptoms abated on 6th day, and tumor gradually disappeared.
23	F. 13. Seen with Dr. Vedder, 1879.	Non-fluctuating tumor in iliac fossa and in rectum.	None.	Recovered.	Bowels did not move until cathartic was given on 8th day; on 9th day abscess burst into intestine—probably the rectum—and blood and pus were discharged with the fæces.
24	M., 18. Seen with Dr. Hicks, Flushing, 1879.	Tumor in iliac fossa; fluctuation absent.	Incision by Dr. Hicks on 15th day.	Recovered.	Disease came on gradually, and was not recognized until end of first week. No chills nor sweats. Abscess diagnosticated by hypodermic syringe before operation. Discharge contained fæcal matter.
25	M., 18. Seen with Dr. Ball, 1880.	Induration deep in iliac fossa and in rectum.	None.	Recovered.	Slight pain in cæcal region for two days, then symptoms of local peritonitis. Resolution on 5th day.
26	M., 12. Seen with Dr. Ball, 1880.	Tumor found only in rectum, where it was very prominent, especially on right side.	None.	Recovered.	Marked flexion of both thighs, disappearing with the subsidence of the tumor, this occurring rather suddenly on 10th day. No pus found in discharges.

Society Reports.

STATED MEETING, MARCH 15, 1880.*

A CASE OF DOUBLE EPIGLOTTIS AND DOUBLE VOICE.

THOMAS R. FRENCH, M. D.

The case is that of a man 30 years old, born in this country, by occupation a singer and contortionist at variety shows.

He came to me complaining of a weakness of the voice; that he could not always grasp the note at the beginning of a piece or turn of a song. He has the ability to command with ease the chest and the falsetto registers, and in singing has a baritone and a falsetto voice. Neither gives him the least discomfort, and in ordinary conversation he has no preference as to which to use. In his family he uses the high voice entirely, but in business prefers the low voice. He uses either according to habit or association, and asserts that many of his friends are not aware that he has two voices. He gained the extra voice when he was sixteen years old.

In singing he always uses the high voice, as with it he can command a greater compass. In the high voice he has the upper and lower range in the falsetto register, and can run the scale from A to F

The compass of the low voice is so small that he cannot reach the high notes of an ordinary song with it, and in singing only uses it to break into the falsetto voice and produce a sensation.

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* Continued from p. 238.

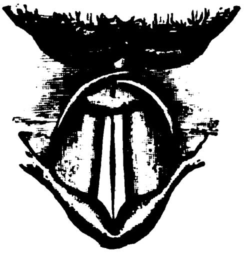
He may be said to command the lower range in the chest register, and can run the scale from A to A.

His throat externally is very prominent on account of an angular curvature of the spine in the dorsal region, The cricoid cartilage is large, and has a deep V-shaped notch in its upper border.

The mouth and throat above the base of the tongue are quite normal in shape and condition.

There is a marked double arrangement of the glandular tissue at the base of the tongue. *The epiglottis is double.* The right half of the cartilage overlaps the left to a slight extent. The division in the mucous membrane extends down to the median glosso-epiglottic fold, but the division in the cartilage must extend further, as during the production of the falsetto voice the lateral halves move inward, as if they were hinged in the middle.

The accompanying cut shows the double arrangement of the epiglottis and the position of all the laryngeal structures during the production of a falsetto note. The vocal cords and structures about them are naturally formed and in proportion to the size and age of the subject.



DOUBLE EPIGLOTTIS.

The difference in the length and width of the cords, as well as the elliptical opening in the falsetto register and apposition in the chest register, can be readily demonstrated.

As to whether the peculiar formation of the epiglottis has anything to do with his ability to command the two voices, I am not prepared to say; but it is very probable that it has, for when the sides of the epiglottis are drawn in during the formation of notes in the falsetto register, the calibre of the laryngeal cavity is decreased to a considerable extent, and thereby probably renders the production of the falsetto voice easier.

MAMMARY TUMOR.

JOHN N. FREEMAN, M.D.

Dr. John N. Freeman presented to the Society a small tumor which he had recently removed from the left breast of a female, æt. 28, unmarried. It was about seven and a half centimetres in diameter, hard, movable and not adherent to the skin, was painless and had been first noticed six months previously. The tumor was examined by the Society, and referred to a committee for microscopical examination and report.

INFANTILE CEREBRAL HEMORRHAGE AND SUBSEQUENT CEREBRO–MENINGITIS.

LANDON CARTER GRAY, M.D.

Dr. L. C. Gray presented the brain of an infant, to the gross appearances of chronic inflammation of which he invited attention, in connection with the history of the case which was as follows:

Male, æt. 4. When about two months old, patient had a violent fall from mother's lap, striking on upper and posterior part of parietal region. Did not become unconscious, or manifest any immediate effects from fall. In the course of two or three weeks the mother's attention was called by neighbors to the fact that the child did not seem to be using its hands, and that there was a flexion of the arm on the forearm and of the fingers into the palm.

Soon after he began to lose the use of his legs. It cannot be ascertained as to whether there was any contracture of the lower extremities at this period. About this time the child lost the power of swallowing. About a year after he had some thirty-two epileptoid convulsions, persisting almost continuously during two days and a night. These were generalized. About a month ago, and also a week ago, had several more convulsions, in which the movements were limited to the eyes and face. In all of these the patient has always been drawn strongly to the right. On January 19, 1879, I saw him in consultation with Dr. James R. King. The muscles of the upper extremity were greatly atrophied. There was marked paralysis and contracture of all extremities. From the contracture the arm is held straight to the side, the forearm flexed at a right angle to the arm, strongly pronated inward and held across chest, the hand extended on the wrist, but easily flexed, the first, second, and third phalanges of fingers and second and third of thumb strongly flexed into palm. He can at times voluntarily extend fingers, and is, as his mother puts it, like a sensitive plant, shutting up when touched; whilst in the lower extremities the thighs are flexed on the abdomen and adducted, legs being slightly flexed on thighs, and there is a talipes equino-varus, these contractures, excepting that producing the talipes, are much less pronounced than in the upper extremity. Reflex movements marked. Patient cannot chew, and has never spoken a word.

I made a diagnosis of meningeal hemorrhage at the vertex of the brain, in the motor region, giving rise to a cerebro-meningitis, and secondary degeneration of the motor tract downward through the brain and the cord.

The muscular farado-contractility was diminished to one-third or one-half below the normal. The galvanic reactions were unaltered.

Treatment was, of course, out of the question.

Patient died in August, 1879. I made a post-mortem examination, assisted by Drs. King, Fowler and Hunt. On the left side, from the fissure of Sylvius upward and along the fissure of Rolando, extending laterally over the adjoining convolutions in an ill-defined manner, were the evidences of a chronic cerebro-meningitis. On the right side similar alterations were seen, but not so marked or extensive.

STATED MEETING, APRIL 19, 1880.

SPECIMEN OF IRREDUCIBLE UMBILICAL HERNIA.

JOSEPH H. HUNT, M.D.

Dr. J. H. Hunt presented a portion of the anterior abdominal wall including the epigastric, umbilical and hypogastric regions, removed *post mortem* from the body of a woman aged about 70 years, who had died from cardiac disease. Through the linea alba, by the side, and to the right of the umbilicus, protruded a hernial sac of the size of an orange; the ring which confined the neck of the sac was dense and thickened by a mass of circular fibres, and had a diameter of 3 centimetres. The sac was filled by a loop of the transverse colon and a mass of omentum; these were agglutinated by adhesions; the hernial mass was adherent to the edges of the ring through about one-half of its circumference by old and firm bands. About 4 centimetres from the edge of the ring, a slip of omentum was firmly adherent to the anterior abdominal wall, forming a loop through which a portion of the intestine might easily have slipped, and an internal strangulation have possibly occurred.

The specimen was deposited in the museum of the Society.

SUTURING DIVIDED NERVE TRUNKS.

LEWIS S. PILCHER, M.D.

Dr. L. S. Pilcher called the attention of the Society to the possibilities in the treatment of divided nerve trunks, which were to be realized by bringing together the separated ends and uniting them by suture. He claimed that in all cases of division of nerve trunks there was no reason to expect any evil effect from such practice. It was true that many instances of spontaneous repair and reunion of divided nerves had been recorded, but in no one case could a surgeon expect such a result; on the contrary, the rule was that degenerative changes rapidly ensued at the divided points, diminishing the probabilities of restoration of the function of the nerve more and more as time elapsed. The best results might be expected in cases of wounds in which nerve trunks had been divided, by at once uniting the separated ends by sutures. In many cases the sutures need be inserted only in the nerve sheath, but, if necessary to obtain sufficient hold, they might be made to traverse the entire thickness of the nerve. In support of his opinion he cited first a case reported by Mr. J. W. Hulke to the Clinical Society of London, Feb. 13, 1880, and recorded in the *British Medical Journal* of Feb. 21, 1880, which was as follows: A man received a deep gash across the front of the forearm just above the wrist, by which the median nerve, radial artery and several tendons were severed. Five weeks later, July 23, 1879, there having been no return of nerve function, the nerve was exposed by dissection. The ends were found three-quarters of an inch apart, the upper bulbous, the lower pointed. The two ends were refreshed, the upper end pulled down, and the ends fastened together by four stitches of very fine silk passed through the sheath; the forearm and hand were then fixed upon a splint. Three weeks later he was discharged, having regained sensibility in the parts before numb, except in the last phalanges of the index and middle fingers. Later further improvement took place.

Second, a similar case which Mr. Howard Marsh, in discussing the preceding case, stated had occurred at St. Bartholomew's Hospital, in which, though the nerve had been injured for some time, the function began to return within twenty-four hours after union.

Third, a most remarkable case of suture of the great sciatic nerve, by Prof. von Langenbeck, of Berlin, related by Dr. Gaston Dupré in a letter to the *Journal de Médecine* of Brussels, 1877.

A man fell upon a cleaver and sustained a deep cut in the back of the right thigh at a point a little above the lower third; loss of motion and sensation in the limb resulted. The wound suppurated, and finally healed at the end of two months. The patient walked with great difficulty, his leg wasted more and more; there was persistent insensibility. Massage, douches and electricity were applied without success. At the end of two years he presented himself at the clinic of Prof. von Langenbeck. The right leg was much wasted; examination by means of needles plunged deeply into the flesh showed the existence of a zone of complete insensibility occupying the outer half of the foot and leg as high up as the upper third of the leg. In walking, the patient halted badly, dragging his flaccid leg and resting on the internal border of the foot, upon the external border of which an ulcer was developing. Upon the back of the thigh, about its lower third, was discernible a large transverse cicatrix. The professor made a long incision perpendicular to the cicatrix, and exposed much cicatricial connective tissue; dividing this carefully, he came upon the peripheral end of the nerve at the lower angle of the incision; this end was slightly swollen. Pursuing his search at the upper angle of the incision, he found, with much difficulty, buried in the midst of a large mass of cicatricial tissue, a large swelling of the size of a good-sized thumb; it was the central end of the nerve. The two ends were distant from each other five centimetres (2 in.). The professor expressed surprise at such a great separation of the two ends of the divided nerve. He drew attention to how much greater was the swelling of the central than of the peripheral end of the nerve. It would be necessary, first of all, to determine that the peripheric end had not become entirely transformed into a fibrous and granulo-fatty cord. For this end, he cut away a certain length of the slender swelling, and ended by finding nerve fibres intact; the same course was pursued with the central end, so that the nerve tissue of the two parts could be placed in immediate contact; then exposing the peripheral end for some distance, and flexing the knee strongly, he brought the two ends of the nerve together. This done, the ends were fastened together by two catgut sutures, which were cut off near the knots; some points of suture were placed in the skin, and finally a bent guttapercha splint applied to the anterior face of the limb so as to maintain the flexion of the knee. No unpleasant symptoms followed this operation. During the next and the following days the patient experienced but little pain; a very slight elevation of temperature, the immediate result of the operation, soon disappeared. At the end of two months, when the case was reported, sensation had been restored to such an extent over the whole part before insensible, that the patient could indicate precisely a point where a slight prick of the skin was made. Motion, however, was yet in abeyance.

The uniform benefits and freedom from dangerous or unpleasant complications attending these cases encourage a more general practice of immediately fastening together by sutures the ends of divided nerve trunks. An extensive test of this method of procedure in the proper cases is urged.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

VII. REALDO COLOMBO.

1494–1559.

COLUMBUS was one of the best as he was also one of the most celebrated of that illustrious line of Italian physicians, surgeons and anatomists, which imparted glory to the medical school of Padua, in the sixteenth century. He was born in Cremona, a small Milanese village, but the precise year of his birth is uncertain. Most medical historians state that he died at Rome, in the year 1577. This is obviously an error. All bibliographers agree that but one edition of his work, *De re anatomica: libri* xv. was ever printed at Venice; this was the first, it was in folio, and issued "*ex-typographia Nicolai Bevilacquæ Tridentini Anno Christi*, MDLIX." Columbus dedicated it "*Datæ Romæ, calen. Junii*, MDLIX," to Pope Paul IV. This pontiff was elected May 23, 1555, and died August 18, 1559. The Pope's privilege to publish the work is dated June 17, of the same year. Now it appears that Realdus Columbus died while the work was in press, but before it was published. A few sheets or copies must have been printed for I am the fortunate possessor of one containing the author's own dedication to Paul IV, and also a copy bearing the same date (1559), identical in every particular as to type, lines, paging, and even errors, but in this the dedication is by the two sons of Realdus, viz; "*Lazarus et Phœbus Columbi S. et F.P.D.*" to "*Pio IIII, Pont. Max.*," who was the immediate successor of Paul IV.

In this dedication the sons say their father in former years had written a work on anatomy in fifteen books, that death came to him after it was set in type, and "although we, who have been thus put about in grief and sorrow on account of the death of so great a man, still we began shortly after to breathe again. O! Pius IV, Pontificus Maximus, we have decided to put forth and dedicate these labors of our father to thy most happy and excellent name." It seems strange that Haller, Eloy, and so many other learned men should have perpetuated so great an error and one so susceptible of correction as above shown. The odd bit of luck by which two copies of this rare book drifted into my hands from two remote points in Europe, whereby I have been enabled to almost determine the day in which death laid his finger upon this grand old anatomist is my apology for occupying so much space concerning this matter of date.

Columbus was probably about sixty or sixty-five years of age when he died, making his birth about the year 1494. The curious engraved title-page represents him with a venerable countenance, a bald head and a lengthy flowing beard. He stands with scalpel in hand, his cadaver on the table before him ; a number of earnest students, for the most part greybeards in gowns, are looking on, some taking notes and others comparing the parts demonstrated with the descriptions and plates in anatomical treatises opened before them. It is a spirited and admirable old wood-engraving, which some execrable vandal has ruthlessly cut out with his knife from one of my precious copies—may his bones and inwards adorn some pathological museum as a warning to others of like disposition.

The father of Realdus was a noted apothecary to which occupation he trained his son, but subsequently put him under the instruction of the distinguished surgeon Jean Antoine Plazzi, and afterward in the medical school of Padua, where he imbibed anatomy from the renowned Vesalius, whose earnest disciple and warm friend, and finally, successor he became.

He spent six years of his life in this city. He filled the chair of anatomy during the frequent and prolonged absence of Vesalius, and when at last his master resigned it, having been called to Madrid as first physician to Philip II, Columbus in 1544 became his immediate successor and filled the position with credit and honor to himself and added renown and popularity to the university. In 1546 he was appointed professor of anatomy to the University of Pisa, whence he was called in the same capacity to the University of Rome, by Pope Paul IV. From this pontiff he received every possible mark of high consideration and favor, in recognition of which Columbus, as above stated, dedicated his splendid treatise on human anatomy. Alas, after the work was in type, but before it was published, both the gifted author and the noble patron had paid the debt of nature.

The fame of Columbus as an anatomical teacher was exceedingly great and wide-spread. Students were attracted to the universities where he professed from all quarters and in large numbers. He was an ardent student of his favorite science and imbued with the genius and enthusiasm of an original investigator. He was not satisfied with the critical examination of mere structure, but extended his researches into the more subtle, difficult and important investigation of physiological function. He has been most aptly styled the Claude Bernard of the sixteenth century. The work of Columbus is a masterpiece in method and purity of style, as well as on account of its richness in facts and observations. He spent over forty years in these studies and researches. He dissected an extraordinary number of human bodies. It must have been an age of remarkable tolerance for scientific investigation, for in a single year he dissected no less than fourteen bodies. He also entered the crypts and catacombs of ancient churches where the bones of the dead had been preserved and had accumulated century after century, and there with unwearied care he handled and compared over a half million of human skulls. Nor did he confine his observations to the remains of the dead, his physiological researches by the aid of vivisections were numberless. He was the first to substitute dogs in place of swine, hitherto only used for this purpose. He wrote a treatise on this subject in which he said that vivisection would teach us more in one day than we would learn in three months' perusal of Galen's works.

The restricted limit of these sketches will not admit of a detailed account of all the discoveries and improvements which were made by this anatomist. Portal, in his history of this science, has quite exhausted this subject and to him the reader must be referred.

His description of the brain and its vessels, the internal ear, the cavities of the heart, its valves, the blood vessels, and the entire skeleton are all more correct than by any previous writer.

The one thing, however, which will outlive all else that Columbus ever did, is his description of the pulmonary or lesser circulation of the blood. The following is as translated by Willis (William Harvey, pp. 89 and 90). " Nothing, however, can pass through the septum between the two ventricles, as is commonly said; for the blood is carried by the vena arterialis to the lung, whence, after having been attenuated, refined and mingled with air, it is brought by the arteria venalis to the left ventricle, *a fact which no one until now has referred to in words or recorded in his writings.*" Concerning the valves our author says. " When the heart dilates it draws natural blood from the vena cava into the right ventricle, and prepared blood from the pulmonary vein into the left, the valves being so disposed that they collapse and permit of its ingress; but when the heart contracts, they become tense, and close the apertures, so that nothing can return by the way it came. The valves of the aorta and pulmonary artery opening, on the contrary, at the same moment, give passage to the spirituous blood for distribution to the body at large, and to the natural blood for transference to the lungs."

Is not this remarkable language to find in a book sixty-nine years before Harvey published his discovery of the circulation of the blood?

This is certainly the first publication of the discovery of the pulmonary circulation ever made in an anatomical work. It is true that Servetus had written a similar description, and it had been printed, but never published, in his work on " The Restitution of Christianity," six years prior to the publication of Columbus' treatise. It is well-known that only two, or at most three copies of the book of Servetus were saved from the fires which burned both author and work.

It is highly improbable that Columbus ever saw or ever heard of the passage in the work of the medico-theological

Spaniard—the poor unfortunate victim of religious intolerance, and of John Calvin's unsanctified zeal. On the other hand, it is quite probable that Servetus must have been present at the lectures of Columbus, and there became initiated into the mysteries of the pulmonary circulation which were already known on Italian soil. Columbus assures us that he was engaged many years in the preparation of his work, and congratulates himself on its completion during the pontification of Paul IV.

Who knows how many years before 1559 it had been in manuscript, or had been taught to his pupils in his lectures? Are we to believe that this man, so beloved by all, so frank, so independent, such a profound lover of truth, is a base hypocrite—a barefaced liar—a literary sneak-thief? I am sorry that Harvey's claims cannot be sustained by Dr. Willis without such an intimation, which is more excusable in James Douglas, who suggested the same thing in 1714. (Bibliographia anatomica.) It is, however, an unsettled question whether Servetus and Columbus, each independently, made this discovery; or that either learned it from the other, and who should have the credit of priority. I incline to Realdus Columbus—the careful dissector and physiological investigator of forty years' application, rather than to the visionary, erratic, metaphysical and theological controversialist, Michael Servetus.

The original edition, Venice, 1559, is printed with large type, marginal notes, no plates or engravings, excepting the full page engraved title above referred to, 269 pages, and 4 preliminary leaves.

De re anatomica : libri, xv, *Venet.*, 1559, folio. *Paris*, 1562, 8°; 1572, 8°; *Francfort*, 1590, 8°; 1593, 8°; 1599, 8°; 1609, fol. *Leyden* (in German), 1667, 8°.

EDITORIAL DEPARTMENT.

THE OBTURATOR ARTERY AND OPERATIONS FOR STRANGULATED FEMORAL HERNIA.

In his Essays on Surgical Anatomy, Dr. John A. Wyeth has made observations on the obturator artery of great interest and value. As the results of fifty-three dissections, twenty-six in females and twenty-seven in males, he has been able to make two deductions of eminent practical bearing. The first is, that in females the obturator artery is derived from the *deep epigastric* in *one* of *two* or *two and a half* cases, eleven out of the twenty-six dissections having demonstrated such an origin; the second is, that in males such an origin occurs in but *one* of *four* or *six* cases five only out of the twenty-seven dissections having presented it. The great point of surgical interest connected with this origin of the obturator artery lies in the course which it shall take in its descent to its canal of exit. Dr. Wyeth's statement is that its usual course is to turn abruptly down on the outer side of the femoral ring, being intimately associated with the sheath of the external iliac vein in such a manner that it would be exceedingly difficult for a femoral hernia to insinuate itself between it and the iliac vein, so that it should become looped around the sac of such a hernia. Nevertheless, the unfortunate cases in which an operation for the relief of strangulated femoral hernia has been complicated with division of the obturator artery, are numerous enough to demonstrate that the instances in which the artery descends into the pelvis at some distance to the inside of the external iliac vein, are less infrequent than the language ordinarily used by anatomical and surgical writers would lead us to suppose. The museum of the ANATOMICAL AND SURGICAL SOCIETY of Brooklyn contains a specimen illustrating this course of the artery. Erichsen quotes Guthrie as saying that he has known some of the best surgeons in London to lose patients by hemorrhage after the operation for femoral hernia. Two recent cases, reported in the *British Medi al Journal* of May 8, 1880, show that such accidents are by no means things of the past. Both of these cases occurred in the same hospital and within a few weeks of each other. Both patients were women. In one the obturator artery was found to have been completely, and in the other partially divided. In both it had arisen from the external iliac in common with the epigastric, and had crossed over the femoral sheath and ran along the inner margin of the crural ring. These cases give us clinical facts which harmonize with the anatomical facts, and unite to enforce a moral in surgical practice that cannot be too strongly impressed nor too often reiterated. The danger of fatal hemorrhage in the operation for strangulated femoral hernia is not a chimæra, not even a remote possibility only, but a probable danger which is to be faced in every case that presents itself. In any woman the chances are even that the obturator artery descends across the crural ring, nor can it be determined except by dissection that its course is not along its inner margin where an incision would inflict a fatal wound. An operator then, who approaches a case of strangulated femoral hernia, cannot avoid the responsibility which the possibility of plunging his patient hopelessly into one danger in the effort to extricate him from another, imposes upon him. What then can be said in justification of the surgeon who turns the keen edge of his knife toward the inner margin of the crural ring, when it is the source of' constriction, or at whose door lies the blame if fatal hemorrhage follows the incision ? When by the use of a blunt instrument to divide the tense fibres, or by the method of scratching them through by strokes so carefully conducted that the point of the knife shall not pass in beyond the tissue of the ligament, this special danger may be guarded against, the surgeon who neglects such precautions assumes an unjustifiable risk. Here is a region where careful rather than brilliant surgery is to be displayed.

THE CLINIC.

PYÆMIA IN INFANT. — Recovery. WILLIAMS. Infant nine days old; mother died of puerperal septicæmia. February 29, 1880, child was found to have extensive suppuration in left elbow joint. Aspirated and 96 *c.c.* of pus withdrawn. March 1st, same quantity removed by aspiration. No progress being made a free incision was used to carry a drainage tube into joint. Dr. Hutchison afterward saw case and regarded it as one of epiphyseal separation with suppuration of joint. By his advice a rubber tube was carried through radio-humeral articulation, and rest maintained by plaster splint. Tube occasionally choked by semi-fibrous or gelatinous masses, which required its removal. No bone discharged though probe detected denudation. Dressings removed in six weeks. Arm restored to good use. During treatment pyæmic symptoms and a series of furuncles. No history of traumatism.

PLASTIC OPERATION. MATTHEWSON. Miss E. M., æt. 20. When a child, was burned by kerosene, leaving complete eversion of left upper lid, edge of which was carried up to or above eyebrow, so that eyebrows and lashes were mingled together. Surrounding tissues so injured as to be unavailable for reparative purposes. Wolfe's method therefore adopted. May 1, 1880, an incision 5 centimetres long made parallel to, and just above eyebrow, lid then pulled down and stitched to lower lid by four fine sutures, causing incision to gap to width of 3.5 centimetres. A thin flap 7.5 centimetres by 4 centimetres was then dissected off the ribs, and fastened by two sutures to raw surface, goldbeater's skin was now applied, covered with collodion, lint and vaseline, absorbent cotton and bandage. Dressings removed in 48 hours. Union by first intention. Goldbeater's skin left on for fourteen days. May 28th, recovery excellent.

EXTENSIVE WOUND IN POPLITEAL SPACE. WIGHT. M. W., 24 years. Left knee run over by car wheel, April 20, 1880. Extensive lacerated wound. Popliteal artery exposed for 5 centimetres. Knee-joint severely contused and circulation impeded so that the tibials were pulseless. Question of amputation raised but deferred for a few hours, at end of which pulsation had returned in vessels. Under simple dressings of oakum and carbolized oil, patient has made an excellent recovery, and is now walking about with a cane.

Needle extracted from Femur. Wight. A. W., a girl of 8 years. Fell and drove a needle into her left knee, the thread hanging out over internal condyle. A V incision having the thread in its angle was at once made, the thread used as a guide was traced down to the bone, and the cartilage covering the epiphysis penetrated by the scalpel before the needle was reached. It was found to have been driven into the bone, *eye first*, and was completely buried. A small portion of the point had been broken off ; the remainder, about 2 centimetres in length, was carefully withdrawn by forceps and the wound closed by sutures. Patient did well.

VOL. II, No. 8. AUGUST, 1880.

ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

DEFORMITY FROM FRACTURES AT THE LOWER END OF THE HUMERUS, AND HOW IT MAY BE AVOIDED.*

By OSCAR H. ALLIS, M.D.

SURGEON TO THE PRESBYTERIAN HOSPITAL, PHILADELPHIA.

I HAVE taken as my subject deformity following fractures at the lower end of the humerus, and I hope to be able to demonstrate that a deformity is favored or produced by the splints usually recommended in the treatment of these injuries; that the deformity will be the same whether the fracture involves the inner or outer condyle or the lower epiphysis of the humerus, and that a similar deformity is likely to follow, even when no splints are used and the limb consigned to a cushion or merely suspended in a sling. The deformity I allude to is one that has long been familiar to surgery and well represented in Figs. 1 and 2.

This deformity exhibits an angularity, the reverse of that seen in the normal arm. In the normal limb, the bones of the forearm make, when extended upon the humerus, an obtuse angle, which will be readily seen by looking length-wise at Fig. 3. This is always present even in muscular and fleshy arms, but is especially noticeable in the emaciated and in the skeleton. Hence a normal arm is not a straight arm. The angle of junction of the arm and forearm is on the radial side of the limb, and the reason of this angularity is found in the well-known anatomical fact, that the inner or trochlear portion of the end of the humerus is lower than the capitellum or radial portion, and when the axis of the articular end of the humerus is examined in relation to the axis of the shaft of the humerus (see both arrows), the angle of their axes is readily seen.

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* Delivered before the Society, April 26, 1880.

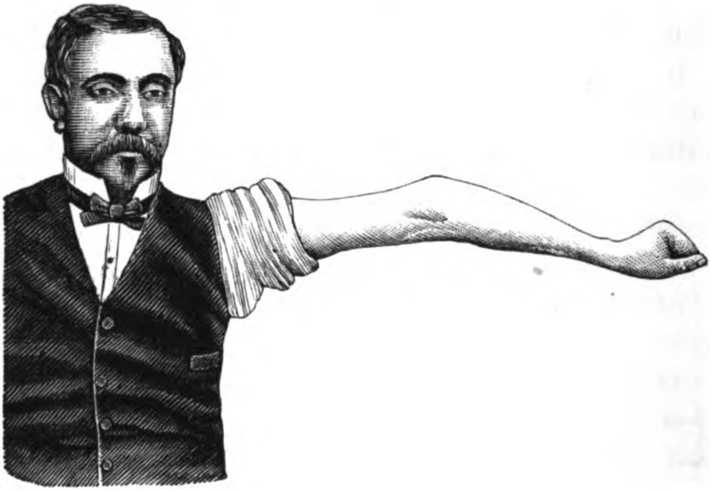

FIG. 1.—DEFORMITY AFTER FRACTURE AT THE LOWER END OF THE HUMERUS.
From a Photograph.

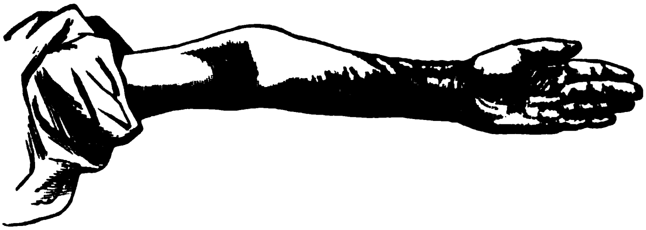

FIG. 2.—DEFORMITY AFTER FRACTURE AT THE LOWER END OF THE HUMERUS.
From Gross' System of Surgery.

Now in the deformity under discussion, the obtuse angle is upon the ulnar side of the limb (Figs. 1 and 2), and I shall endeavor to show that this is favored, if not directly produced, by the usual mode of treatment.

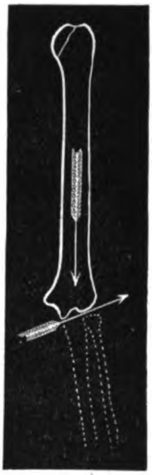
FIG. 3.—NORMAL ANGLE OF BONES OF THE FOREARM WITH HUMERUS.

The first splint that I shall examine is the well-known Physick's elbow splint. It consists of two thin strips of wood, joined at a right angle as represented in Fig. 4.

It is applied to the limb when bent at a right angle and secured to it by a bandage extending from the hand to near the shoulder. At a superficial glance the splint seems to be a most happy contrivance, since it is inexpensive, light, may be applied with ease, readily removed, and when in position affords a safe, secure, and comfortable dressing. But let us look more closely at its adaption to the *bones* of the part; for it is the mal-position of the bones during repair that produces permanent deformity. If we glance at the bones of the forearm as they join the humerus, we will see that under no circumstances are they upon the same level; that the radius, when the arm is bent, as in Fig. 5., is more superficial—is upon a higher plane than the ulna; and that the splint (Fig. 4.), when applied, rests at the bend of the arm upon the radius, and does not and cannot touch the ulna. In other words, the splint does not rest equally upon the radius and ulna at the bend of the arm.

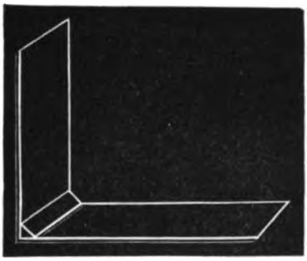
FIG. 4.—PHYSICK'S ELBOW SPLINT.

Now the effect of this may be better understood by a figure representing a front view of the humerus—Fig. 6. Let the radius (*R*) and ulna (*U*) appear as when the forearm is bent at a right angle with the humerus. Now in the application of the splint, it (the splint) will be seen to rest on a level with the top of the radius (see line *A*), and when the bandage is applied, passing as it does under the forearm, it (the bandage) will be seen to exert its influence wholly upon the ulna (see line *B*). Let us suppose the fracture to involve the internal condyle, and that the internal condyle attached as it is to the ulna, is the movable, non-resisting part of the joint. Now what would be the most natural consequence from the pressure upward upon the ulna from the bandage, and the resistance or counter-pressure from the splint? Will it not be to carry the non-resisting ulna up toward the fixed resisting splint, and thus elevate the internal condyle, as remarkably well shown in Fig. 7? But there is a second point of great importance in the mechanism of this deformity, viz., that the pressure and counter-pressure are not opposite each other. Look again at the figure (6) and it will be seen that

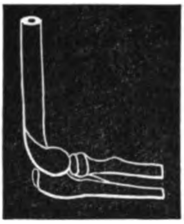

FIG. 5.—THE DIFFERING PLANES OF THE RADIUS AND ULNA.

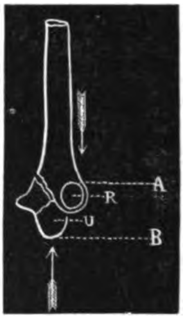

FIG. 6.—RELATIONS OF ARTICULATING PORTIONS OF RADIUS AND ULNA TO LOWER END OF HUMERUS, IN FRACTURE OF THE INTERNAL CONDYLE.

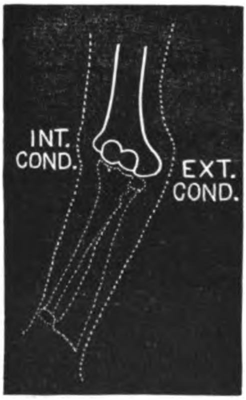

FIG. 7.—ALTERED SHAPE OF THE LOWER END OF THE HUMERUS AFTER FRACTURE OF THE INTERNAL CONDYLE.

The whole deformity is produced by the elevation of the condyle. See Gurlt, *Knochenbrücke*, vol. i, p. 317.

the upward pressure from the bandage (lower arrow) is near the middle of the joint, while the downward pressure, *i.e.*, *resistance*, is at the outer border of the joint, and depends upon the fact that the external lateral ligament is still secure. Hence the upward pressure will not only tend to elevate the internal condyle, but to give the olecranon a peculiar twist toward the now displaced inner condyle. Thus are brought about the most constant deformities in injuries to the internal condyle of the elbow-joint, viz., elevation of the condyle and an inward twist of the olecranon.

Let me now change the dressing and apply the posterior angular splint, an instrument represented in Fig. 8, and too familiarly known to require description. By this arrangement the ulnar surface of the forearm rests in the splint, and the bandage is applied to its upper or radial surface. Now the same principle holds good here as in the previous splint. Between the bandage and splint there is pressure. But the bandage is now applied over the radius, fixed, because attached to the sound part of the joint, while the splint, resting as it does upon a movable ulna—movable because attached to a broken condyle—will yield to the influence of the bandage, will rise, and thus produce the precise deformity brought about by the former splint.

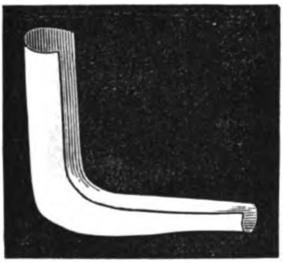
FIG. 8.—POSTERIOR ANGULAR SPLINT.

A third splint is the internal angular (Fig. 9), and is a favorite instrument with some surgeons. It is very

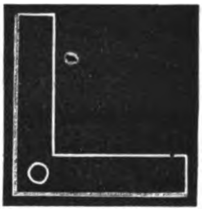
FIG. 9.—INTERNAL ANGULAR SPLINT.

light, and since it is applied to the inner aspect of the arm and forearm, an opening is left to avoid pressure upon the epitrochlea.

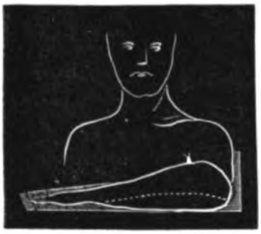

FIG. 10. — RELATION OF BONES OF FOREARM TO SPLINT.

Dotted line indicates lower border of ulna, and the figure shows how little support the bones of the forearm get from the splints.

When the splint is applied it would seem to meet every indication, but if we look at the splint as a means of support to the bones of the forearm, we will see that as they approach the humerus neither of them get the least support (see dotted line, Fig. 10), and when the bandage is applied, its force must displace the movable condyle. One of the worst deformities I have ever seen (Fig. 1, page 290) was treated by an eminent surgeon on such a splint as this—the original injury being merely a simple fracture of the external condyle, Fig. 11.

Let us now take a fracture of the external condyle (Fig. 11) and apply the first splint, the anterior angular. Here we have the internal condyle fixed and the outer condyle movable. The splint rests upon the movable radius—movable because attached to a broken condyle (*A*), and the bandage is applied as before around the ulna (*B*). What now must take place? The ulna cannot rise, but the radius can fall, and thus the axis of the articular surface of the humerus suffers the same practical change as by an elevation of the internal condyle, and the same deformity is produced.*

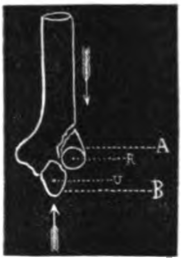

FIG. 11. — FRACTURE OF THE EXTERNAL CONDYLE.

Let us now apply the same principle to a fracture of the epiphysis. In this injury the articular extremity is severed from its connection with the shaft of the humerus, though its connection with the radius and ulna has not been in the least disturbed. The shaft of the humerus has no controlling influence in the mechanism of deformity from this accident, but the bones of the forearm having the full control of the epiphyseal fragment, can dispose of it as they will. Let the same splints be now applied as to Fig. 6. Here the pressure lies between the horizontal portion of the splint and bandage as before, but now both bones, radius and ulna, are at liberty to move, and what must be the effect of pressure downward upon the prominent radius and pressure upward upon the prominent ulna? Will it not be, in effect, to change the axis of the articular surface, and to change it as it has been changed in the other injuries?

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* See pages 298–9, Figs. i–xvi–xviii–xix.

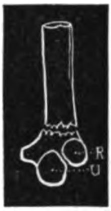

FIG. 12.—FRACTURE OF THE EPIPHYSIS.

I have thus far spoken only of the effect of splints as mechanical agents favoring deformity. I wish now to mention another agency, since I stated in the outset that deformity of a similar kind might follow the non-employment of splints. It is not strange that the agency of the muscles would produce a deformity, but it is a little remarkable that in this class of injuries, and especially in fractures of the internal condyle, the action of the two powerful muscles, the triceps and brachialis anticus, should, by their attachment upon the ulna (just in front and behind the fractured condyle, Fig. 13), lift the condyle and produce an effect similar to that of the splint. Such, however, must be their action, and a similar action would be likely to follow from an epiphyseal fracture; but just what deformity would follow from mus-

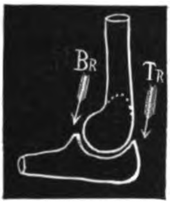

FIG. 13.—ACTION OF MUSCLES ON HEAD OF ULNA.

cular action alone when the fracture was confined to the external condyle I am not able to point out.

When a fracture at the elbow is treated without splints, as it sometimes is, the resulting deformity cannot fairly, I think, be wholly attributed to muscular action. It must never be lost sight of that the fracture has occurred at the junction of two long levers, the arm and the forearm, and the mere position of the forearm can dispose of the detached condyle as it chooses. Let any one lie on his back and place his elbow on a cushion, thus imitating the position assumed in this peculiar treatment. He will notice that the internal condyle lies on the pillow and almost perpendicularly above it is the external condyle. Hence the limb is in the position most favorable for the forearm by its weight alone to drag the external condyle down or push the inner one up. When the arm is carried in a handkerchief, if this is tied so tightly about the neck as to support the entire weight of the limb, a deformity from the combined action of *the support* and the muscles will be inevitable, if the fracture is of the internal condyle. If, however, the forearm rested lightly in the sling, then the deformity would lie between the muscles and the position assumed by the forearm.

What I have said thus far will find some support in the frequency with which this class of injuries is followed by deformity, and the peculiar resemblance these deformities have to each other. In order to make this the more striking I have collected and grouped nineteen cases (pages 298–9); four of these are from the Empire State, fifteen from the Keystone. A peculiar deformity, well described as the gun-stock, will be seen to run through them all, and this will be best seen by glancing the eye along each as upon a gun. Had each of these cases suffered from the same accident, fallen under the care of the same surgeon, and been treated on the same splint, there would not be any wonder at so strong a resemblance; but the fact is, sixteen medical men, each unconscious of the other's mode of treatment, had the care of these nineteen cases.

Case i was treated by a surgeon eminent in his day in Philadelphia. He employed an internal angular splint. Case iii was treated by the interne of one of our hospitals, fresh from college, and though at the time not competent to treat the case intelligently, yet the result compares favorably with the first. Some of these were treated by physicians who made no pretensions to surgery and who certainly had little surgical experience. Such a case is No. x. Cases vii, xviii and xix were treated by a surgeon of rare promise, and one who has had a great deal of experience in elbow injuries. Cases iv and xiv were treated by men who had hospital experience during the late war, and both felt they knew how to treat a fracture in this vicinity. One thing I can say of all of them, viz., the rectangular position recommended by all writers was the one adopted, and while some used the anterior, others the internal lateral, and still others sole leather splints, yet all have produced deformities as much alike as if one person and one splint had been alone employed, and that too upon the same fracture.

It would be a most sweeping assertion, and one that I am not prepared to make, that the right-angled splints can never be safely used. Surgeons have told me that they have had good results from the very splints I so earnestly condemn. That this may occur and be rather due to the fortunate character of the fracture than the skillful application of a splint, I think I can make clear by a diagram (Fig. 14), exaggerated to best illustrate my idea. Let the upper part of the figure represent the humerus with its

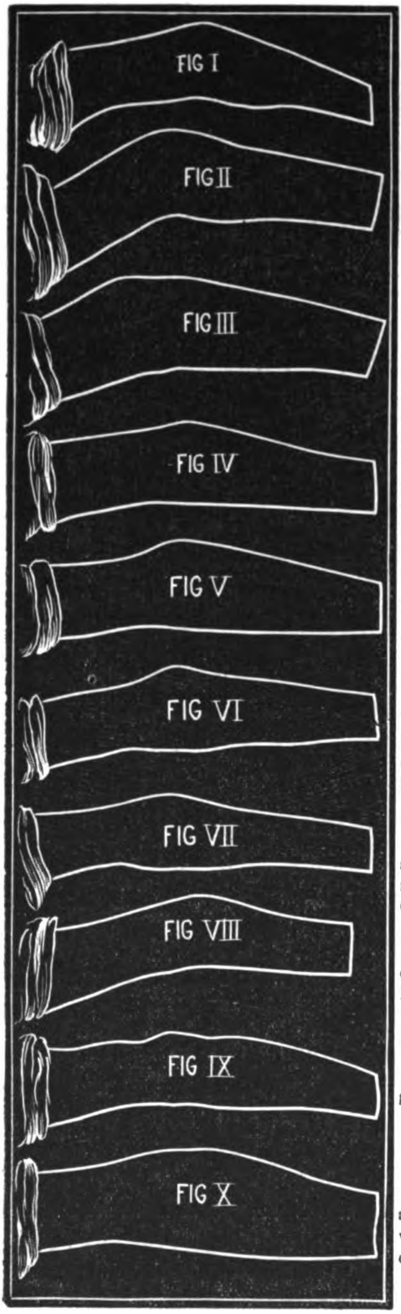

Fig. I.—W. R. Ext. condyle fractured when 14 years old. Internal angular splint. Extreme deformity. Good motion except carrying.

Fig. II.—Louis L. No history. Partial dislocation of head of radius. Int. condyle raised ⅜ inch, olecranon slightly twisted, no abridgment of motion.

Fig. III.—Fracture of Int. condyle. Twist of the olecranon. Condyle elevated ½ inch. Rectangular dressing. Both flexion and extension slightly abridged.

Fig. IV.—J. H., left arm, two years ago. Ext. condyle depressed ⅛ inch. Line of fracture still very plain. Rectangular splint. Extreme flexion a little abridged. Carrying function lost.

Fig. V.—F. R. G., left arm injured in childhood. No history. Int. condyle now ½ inch above the line of the external. Function good except carrying.

Fig. VI.—Geo. F. Fracture occurred in early infancy. No history. Int. condyle elevated ⅜ inch, olecranon twisted inward. Motion equal to sound arm.

Fig. VII.—Geo. T. Int. condyle of left arm. Treated with sole leather splints at right angles. Condyle elevated ⅛ inch. Good motion.

Fig. VIII.—J. F. Fracture Int. condyle two years ago. Rectangular splint. Motion abridged one half.

Fig. IX.—Taken from Dorsey's Surgery, Edition, 1813, vol. 1.

Fig. X.—Fracture Int. condyle when about six years old. Int. condyle elevated ¾ inch. Every function but the carrying. Rectangular dressing.

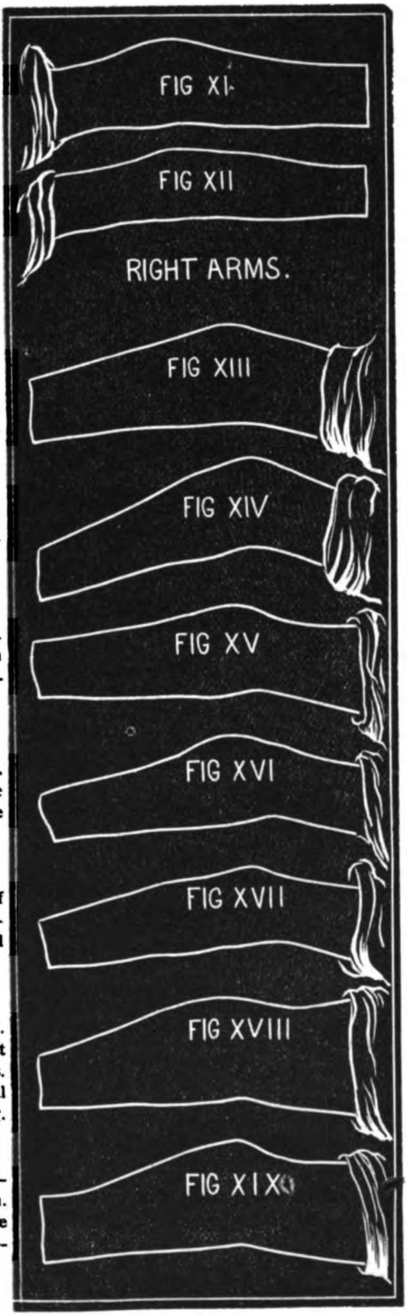

Fig. XI.—From Gross' System of Surgery.

Fig. XII.—R. L. S., 55. Fracture occurred in early life. No loss of function save the carrying.

Fig. XIII.—Wm. D., 34. Fracture Int. condyle in early life. Condyle raised ⅛ inch above normal level. Treated with wooden rectangular splints. Good movement.

Fig. XIV.—John F., 12. Fracture Int. condyle about four years ago. Great deformity. Good function. Angular wooden splints.

Fig. XV.—G. G., 62. Fracture Int. condyle in early childhood. Treated on wooden splints. Good motion. Carrying function impaired.

Fig. XVI.—Wm. S. Fracture of Ext. condyle. ⅛ inch difference between the elevation of the condyles. Extreme flexion impaired. Good motion.

Fig. XVII.—W. P., 25. Fracture of Int. condyle, in early childhood. Condyle elevated ⅜ in. Olecranon twisted toward it. Good motion.

Fig. XVIII.—Willie W., æt 10. Ext. condyle fractured. Treated at right angles with lateral sole leather splints. Ext. condyle ⅛ inch below its normal level. Every function good save carrying.

Fig. XIX.—Fred. H., 9. Ext. condyle ⅜ inch below normal position. Good motion. Treated with lateral sole leather splints, well softened before application.

trochlear surface, and the wedge below represent the olecranon. So long as the fracture is but partial, as at (*A*), the point of the wedge may catch above and pressure hold it in place. But when the fracture is at (*B*), *i. e.*, at the centre of the trochlear surface, then there is no point for the wedge to catch, and any upward pressure from bandage or muscles will lift the fractured condyle and render deformity inevitable.

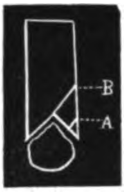

FIG. 14. — DIAGRAMMATIC REPRESENTATION OF RELATIONS OF ULNA TO CONDYLOID FRAGMENTS OF VARYING SIZE.

Dorsey, as long ago as the year 1813, in his "Elements of Surgery," vol. i, calls special attention to this deformity, and takes the pains to present to the eye a full-page figure of a normal arm and contrasts it with one bearing this deformity.

He says that it does not matter much when the deformity happens to a man if he enjoy all the motions of the joint. I agree with him that it is a much greater deformity in women than in men, but there is a function happily styled the "carrying function" by my friend, Dr. Fowler of Brooklyn, that is of the greatest importance to the laboring man. By means of the natural angularity of the limb, he is enabled to rest the inner condyle upon the swell of the pelvis, and thus carry a weight with the least expenditure of muscular force, while this "carrying function" is lost to everyone bearing the deformity above mentioned.

I come now to the second part of my subject, viz: how to obviate this deformity.

Upon this part I feel that I can speak with the force of practical experience. Believing,—as I always have,—that the deformity was produced by the splints employed, I have never, in a single instance, employed a manufactured splint. Believing also, that it was just as safe to dress the limb in the extended as in the flexed position, I have, with few exceptions, adopted the former. Upon these two points hangs the success I have had in overcoming the deformity so frequently seen here; for I say candidly—not boastfully—that I have never had what might be called a deformity from fracture in this region.

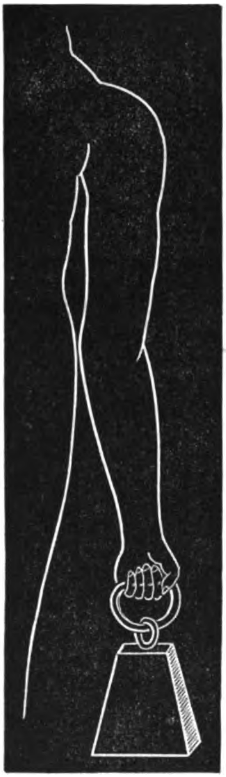
FIG. 15.—RELATIONS OF OUTWARD ANGLE OF FOREARM WITH ARM TO THE CARRYING FUNCTION.

The first case that I treated, was in my clinical service at Howard Hospital. A lad was brought to me about six years of age, with fracture of the internal condyle (trochlea). The injury had just happened, and there was but slight swelling. Taking the limb, I placed it in an easy, natural, extended position, and then entrusting it to an assistant, I applied strips of adhesive plaster, about an inch wide, and long enough to extend from near the shoulder to near the wrist, so as to cover in the surface of the limb. Over this layer I applied a second layer, thus having two layers of longitudinal adhesive strips about the joint. In this condition I dismissed the lad with instructions to the mother. I saw the case frequently at first, and then once a week, and, at the end of six weeks, removed the first and only dressing. If any one will reflect a moment, he will see that such a dressing was not a shiftless or reckless affair, but one that met every requirement of the case. First, in the two layers of adhesive plaster there was sufficient firmness (stickiness) to keep the whole limb in the position in which I first left it. Second, there being nothing about the joint but adhesive plaster, the little fellow, as soon as the pain left the arm, began by degrees to use it, and this was not wholly prevented by the adhesive plaster dressing. Thirdly, as there was nothing but adhesive plaster about it, I could handle and press the tissues about the joint, and thus by their tolerance of manipulation, form an accurate estimate of the true condition of the joint. I retained the dressing longer than was necessary, and when I removed it I found neither deformity nor limited motion—the result was, if such an expression is ever admissible, perfect.

This application of longitudinal strips of adhesive plaster is a favorite dressing of mine. If, for one moment, the mind is permitted to revert to the character of the injury (the fracture of the internal condyle for instance), it will be seen that the defect is confined to that region, and he who puts strips of adhesive plaster along the inner and outer aspects of the joint, is, as it were, adding two surface hinges to the arm, until nature shall have repaired the broken internal hinge. These lateral strips are greatly supplemented by the other strips, as one will see that it is practically impossible to use the arm much with plaster adherent to its whole surface.

In subsequent cases I used the adhesive plaster in part only. Thus, first applying the longitudinal strips, one over each condyle and one posteriorly, in other words, covering the postero-lateral aspects of the limb with adhesive strips, I have added a layer of cotton batting, and over this applied a bandage.

In still other cases I have omitted the adhesive strips entirely, and applied a firmer dressing. A favorite dressing is the egg paste.* This I usually apply at the end of a week, but have often applied it immediately after the accident. These are the details of the dressing: Placing the limb in an easy, extended position, I apply a layer of cotton batting to the joint, and for some distance above and below it; over this I apply a bandage, and as soon as the cotton is covered in I smear the whole surface of the bandage with the paste, then add a second layer of bandage, which, in turn, is covered with the paste, and the dressing finally completed with a third layer of bandage. The perfection of the cure will depend wholly upon the natural position assumed by the limb while the dressing is applied. Hence, lay the patient on the back, and with both arms stripped take the sound arm as the guide. When the limb is placed supine, the thumb looking outward, *note that the normal limb is not straight*, but that an obtuse angle is to be observed on the radial side of the elbow joint. Observe this in the dressing, and if this is carefully preserved until the paste has hardened, there is nothing to fear from displacements. The hand can then be placed prone if more agreeable. Should there be the least doubt of the accuracy of the position after the forearm is prone, then place its fellow prone and compare them.

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* Take the white of two or three eggs and stir into it enough flour to make a paste. This is rubbed or smeared on with the hand, and when dry, becomes a firm, hard dressing.

The reasons why I place the limb in the extended position are:

(*a.*) In this position I have an advantage of comparison during the dressing that I have in no other position. (*b.*) When only one condyle is broken, if the ulnar side of the joint is the only one that is injured, I have, in the extended position, the whole length of the radius to act as a splint or a controlling lever.

In this position the head of the radius abuts against the sound outer condyle, and by its prodigious leverage with the ulna can keep the internal condyle from ascending; while the surrounding paste dressing, having hardened, will favor the retention of the ulna, will prevent its wedging off the condyle, and thus retain the fragments until union no longer requires the dressing.

I sometimes dress the limb at a right angle, but rarely, except when in consultation. When this is proposed, I dress the limb with cotton and the bandage for a week in the extended position, and then, bending it to a right angle, I apply about the joints, first the cotton, then the bandage and paste, as already fully described. This dressing is essentially different from the angular splints, as will be readily seen. First, I apply it after the limb has been dressed in the extended position a week; second, the dressing is applied in a plastic condition, and accommodates itself to the limb. There are no fixed points like the arms of a wooden arbitrary splint to which the bandage can force the broken condyle, and hence the dressing, when first applied, can hardly be called a splint, and only becomes one a few hours later when it has hardened. If, while it was hardening, the limb was in a natural position, then the hardened dressing becomes a perfect outside case, and the cure will be a good one. Should any one desire to remove such a splint as this it can be cut the entire length of the limb and readily sprung off with cotton *in situ*, and reapplied without any possible mischief, while the fixed angular splints, applied as they are with a fresh bandage after each removal, are calculated to do additional harm at each dressing.

I have thus far confined myself to the *deformity*—how it is produced and how it may be avoided. I will now add briefly a few general remarks upon the medical aspects of the case.

The prevalent opinion in regard to this joint is that it is especially prone to stiffness, anchylosis and deformity. I have fully discussed the latter point, and will now take up that of stiffness and anchylosis. This sequel to these injuries is so much dreaded that authors and surgeons are most earnest in pointing out the necessity of early and, if necessary, persistent passive motion. Some recommend that this feature be instituted even during the first week, others in the second, but all agree that it is never to be lost sight of.

Upon this subject I desire only to state my own practice, not to recommend it. My prognosis in all these injuries varies with their degree and character. If a child falls from a chair, from a fence, or from a tree, the same fracture may be produced in each case, but the amount of injury to the soft parts may vary greatly. In the first case it may be very slight. In the third it may rise to its maximum.

By this illustration I wish simply to remark that, as there are distinct and well-founded grades of injury, so there may and should be a course of treatment suited to each grade, and that it is a great mistake to prescribe a uniform line of treatment for all these injuries.

Again, whatever the nature or character of any individual fracture, its treatment may be divided into three stages: (*a*) the treatment of the initial lesion, (*b*) its treatment during repair, (*c*) the means necessary for reclaiming the function.

The FIRST or milder grade of fractures about the elbow-joint requires attention only to the initial lesion. If well "set," if properly dressed, they will usually give no trouble during the entire period of repair, and when the period of usefulness arrives, viz., the period of functional activity, no passive motion will be required, since Nature stands ready to resume the function which she herself suspended.

The SECOND or middle grade of injuries requires slightly different treatment under each head. The initial lesion may require a first dressing of cotton, or anodyne lotions, and the permanent dressing may be a little delayed. In the second stage, it may be well to remove the dressings to favor the decline of inflammation that may still persist, to bathe the limb or apply liniments to allay soreness. This stage (the stage of repair) may be one of some discomfort to the patient, but it need not be one of solicitude to the medical attendant. If the limb has been kept quiet * during the first and second stages, there need be no distrust about return of function. This will not be so early and rapid as in the first grade, but this cannot fairly be expected of it. It was a severer injury in the outset, and hence its restoration will be more delayed. In this class, as in the first, I do not resort to passive motion during the second stage. I give the bone time to heal, and the soft parts to get well, before I begin motion; and when employing motion, if I find that beyond a certain degree of flexion and extension, pain is produced, I assure my patient that he is to employ his limb gently and mildly, and that the full function will return as soon as soreness has disappeared.

I come now to the THIRD grade of injuries. This class especially demands the most judicious surgical skill during all the three stages, viz.: during the initial lesion, during repair, and in its full restoration to usefulness. In this class the injury is of the severest character, and the few moments that I have left me are wholly inadequate to treat the subject. I pass by the first stage—a most critical one to the patient—and attack only the single query, "shall passive motion be instituted during the second stage?" My own practice is to *maintain absolute rest.* I do not hope for early functional return in this class. I am willing to prescribe four or six months to such cases.

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* By this I do not mean that the arm should not be removed from its dressings, daily if necessary. By *quiet* I mean *no passive motion* during the first and second stages of injury.

But the question arises, will early passive motion hasten matters any? My reply is, I believe that it cannot hasten, but may greatly retard the cure. In this class I give the parts rest, hoping with the judicious use of liniments, the douche, shampooing and the like, to lessen pain and restore a healthy action, but defer the third stage of treatment to its proper place. In the fifth or sixth week, gentle motion may be applied. In cases such as these, when the swelling and inflammation have measurably subsided, it may expedite matters to give an anæsthetic and gently flex and extend the forearm. Two or three slow motions under ether, and repeated after a week,—the arm being kept quiet in the interim,—may be of great advantage here. But this need not be done earlier than the seventh or eighth week. I am aware that many of the books and many surgeons will say that such stiffness *could have been avoided* by early passive motion, but I simply state that I hold a contrary opinion.

When others claim that they begin passive motion in the second week and never have anchylosis, I wish my experience to be put along side of theirs, and I repeat that I never use passive motion under any circumstances earlier than the fourth week, and in the milder and middle grades have never any trouble with functional return—while in the severest grades of injury there is great injustice done the medical profession as well as to the patients by intimating that any course whatever would have insured a prompt return to usefulness.

But while some claim that by early passive motion they never have anchylosis, they omit to mention the three or four weeks of torture through which they often lead their patients by such a course. No surgeon of experience has failed to note the gradually increasing soreness that has followed this untimely interference, and many is the doctor that has been forced to desist from such a course, and many is the mother that has taken her child to the rack until maternal instincts have yielded to the importunities of the little sufferer, and, preferring a stiff arm, she has abandoned treatment. Thus dooming the child to inevitable anchylosis? By no means. The little one kept his arm quiet until pain disappeared, and then began to use it.

I have thus, gentlemen, laid before you my own views and practice. There has been no time for argument. Hence, all I desire is that, in consequence of the frequency of these injuries, and the prevalence of the deformity, you would examine anew the subject.

Society Reports.

STATED MEETING, MAY 17, 1880.

CASE OF COMPOUND COMMINUTED DEPRESSED FRACTURE OF THE SKULL. RECOVERY,

WITH REMARKS UPON THE SENSITIVE NERVES OF THE DURA MATER.

FRANK MADDEN, M.D.

E. R., æt. 5½. Was admitted into the Eastern District Hospital of Brooklyn, October 15, 1879, at 8.45 A.M., with the following history. That morning between seven and eight o'clock, he with other children was witnessing the raising of certain circus tents. In raising the centre pole for one of the large circular tents, it slipped from the grasp of the men raising it and fell to the ground, in its descent striking the boy upon the head. He was picked up unconscious and conveyed to the hospital.

Upon admission he was in a comatose condition. Pupils slightly dilated. Pulse strong and rapid. Respirations slow and somewhat labored.

On examination it was found he had a compound depressed fracture of the left parietal bone, where it forms the lateral and posterior portion of the vault of the skull; the wound in the scalp about two inches in length extending obliquely from behind forward, through which the broken fragments of bone could be seen and felt pressing upon the brain, forming a sort of cup-shaped cavity, the convexity of which was imbedded in the brain.

About three-quarters of an hour after admission he was anæsthetized with ether, and five pieces of bone were raised and removed by Dr. S. J. Brady. It was then discovered that a fissure extended from the external or left side of the opening left by the removal of bone, obliquely downward and forward toward the left ear, but there was no depression. The periosteum was completely denuded from the fragments of bone removed. The opening left by the removal of bone was of an irregular pear shape, measuring 7 centimetres in its longest diameter each way, and 3½ centimetres at its anterior or narrowest point, where the inner corner of the opening extended about a quarter of an inch beyond the median line, involving a portion of the right parietal bone. The dura mater was apparently uninjured, except a few bleeding points where the nutrient vessels of the bone were torn off as they entered the inner table. All the sharp spicula of bone around the edge of the opening were trimmed off carefully. The wound was then thoroughly cleansed with carbolized wash, and the edges of the scalp brought together and held in apposition by horse-hair sutures, and dressed with a pad of lint saturated with carbolized wash.

The patient was then placed in bed, bottles of hot water applied to lower extremities and body, and pot. brom. gr. v and tr. aconit. rad. ♏ss. ordered every two hours.

At 5 P.M., reaction had fully set in, and the patient was then perfectly conscious, skin warm and moist; but very restless and irritable, tossing about in bed, constantly crying and making efforts to remove dressings from the head. At 6 P.M., in order to quiet him and relieve the pain from which he was evidently suffering, ♏iv of Magendie's solution of morphia were given hypodermically, dressing being constantly bathed with cold carbolic wash.

October 16, 1 A.M.—Patient sleeping quietly. Takes a drink of milk occasionally when he awakes. 8 A.M.—Again becoming restless and irritable. Complains of pain in the head. Extremities cold. Ordered warm applications to body and limbs, and whisky and milk equal parts, teaspoonful every hour. Discontinued use of aconite. 7 P.M.—Sleeping quietly. Body and extremities warm. When he awakes he is very irritable and still complains of pain in the head. Ordered whisky discontinued.

October 17, 3 A.M.—Was called to see the patient. Found him crying piteously and evidently suffering from severe pain, which he referred to his head; to relieve which ♏iij of Magendie's solution were administered hypodermically. This had the effect of quieting him almost immediately, and at 3.15 A.M., he was quietly sleeping. 9 A.M.—Is still, when awake, restless and irritable, but is perfectly conscious and recognizes those about him. Wound looking well. Not much oozing. 7.30 P.M.—Restless. Head feels hot to the touch. Ordered pot. brom. gr. vij ss and tr. aconit. rad. ♏ss every hour.

October 18, 9 A.M.—Rested better last night than any night since his admission. Wound looking well. Primary union in the anterior portion, from which sutures were removed. Dependent portion beginning to suppurate. Ordered tr. aconit. rad. discontinued. 7.30 P.M.—Looking bright. Ordered pot. brom. to be given every two hours instead of every hour. From this date there was a constant and rapid improvement toward convalescence and final recovery. He was discharged from the hospital, December 17, 1879.

On October 24 an eruption of acne was observed upon the face, chest and limbs, doubtless due to the amount of bromide of potassium taken, for upon discontinuing the remedy this trouble gradually disappeared.

A daily record was kept of temperature, pulse and respiration.

The temperature ranged from 36.3° to 37.9° C., the latter being the highest point which it reached during his entire stay in hospital. This maximum temperature was observed upon the evening of October 22. There were many slight variations in temperature during his period of treatment, but all of them were due and directly traceable to mental or physical excitement at or just previous to the observations being made.

Upon several occasions observations were made upon the pulsation of the brain (as seen through the integument covering the wound), while the patient was quietly sleeping and when he was awake, to determine whether there was any difference in the same during those two conditions. The result of these observations was that, when he was sleeping quietly, there was a marked diminution in the force of the pulsations. When awake there was a marked increase in the force of the pulsations, which would be still further increased upon any violent exercise, either mental or physical.

Remarks.—At no time during the history of this case, were there any *inflammatory symptoms*, or *traumatic fever*, as evidenced by the record of temperature. But during the first three days there were two prominent symptoms connected with the nervous system, *i. e.*, *local pain* and *general irritability*, which have to be accounted for. As there was, during this period, no inflammatory process set up, they cannot have been caused by that condition.

These two phenomena—local pain and general irritability—especially the latter, were no doubt reflex disturbances, due to the nerves of the dura mater, which were pressed upon by the depressed fragments of bone, possibly contused or lacerated, certainly irritated by the injury.

It has long been known that the dura mater is supplied by sensitive nerves, derived from the fifth pair or Trigeminus, of which Froment, Arnold, Cruveilhier and Bonamy have given the best description. As early as 1841 Marshall Hall (*Med. and Chir. Trans.*, vol. iv, p. 122, 1841) announced that irritation of the nerves of the dura mater caused convulsive reflex action, but did not give any reason for the phenomena. In the early part of 1878 M. H. Duret * published the result of some experiments he had made upon animals to determine the effect of irritation of these nerves, and his conclusions are as follows:

"The dura mater contains sensory nerves eminently excitable. I. As is the case with all sensory nerves perhaps, irritative lesions of these nerves cause: (1) pain, hyperæsthesia, neuralgia and reflex motor phenomena; (2) reflex spasms or contractures of the muscles of animal and organic life. * * * II. Destructive lesions cause local anæsthesia of the dura mater."

I am therefore convinced that the early and marked symptoms in this case are to be attributed to the undoubted irritation of the nerves of the dura mater; and that this case fully coincides with the experimental researches, and corroborates the views, of M. Duret upon this subject.

ALVEOLAR ABSCESSES.†

GEORGE W. BRUSH, M.D.

What I have to say upon this subject will be devoted to the conditions which cause the disease, and what may be done to prevent or at least ameliorate the suffering produced by it, giving a few cases from my own experience as examples.

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* See article in part i, "Brain," April, 1878: On the role of the dura mater and its nerves in cerebral traumatism.

† Read before the Society, June 21, 1880.

In many cases which come under our notice the abscess is so far advanced that suppuration is unavoidable, and we must address ourselves to the relief of pain until the pus can be evacuated; but the majority of cases among the better classes of the community apply early for treatment, and we may be able to prevent the case running through the tedious course which an alveolar abscess often takes, with its attending suffering. What are the symptoms which precede or usher in this disease? First, the aching pulp, followed by its death; then irritation, extending to the periosteal, or peridental membrane which lines the socket of the tooth. The tooth becomes very tender upon percussion and intensely painful; this is finally followed by swelling of the parts and the formation of pus, the discharge of which brings relief.

Sometimes a dead tooth or root may have remained for a long time without creating disturbance, the pulp having died months or years before and been mainly absorbed, so that on opening into the pulp chamber it will be found empty, or nearly so. It will be seen from this that an alveolar abscess does not form without the death usually of the whole pulp of the tooth or at times only that part of it upon which the abscess appears. It will also be seen that the disease is not, properly speaking, in the tooth itself, but involves the peridental membrane which covers the root; this is acted upon by the irritating gases emanating from the decomposition of the pulp tissue, these gases finding their way through the foramen at the apex of the root of the tooth.

The disease in its first stages is therefore properly termed periodontitis. It is important that we discriminate at this point, and recognize the difference between periodontitis and simple pulp irritation, or pulpitis, or in other words, ordinary "toothache," in order to properly treat the disease. The following simple rules I have rarely found to fail:

PERIODONTITIS.	PULPITIS.
1. Tooth tender on percussion.	1. Not tender on percussion.
2. Darker than surrounding teeth.	2. Not changed in color.
3. Pain continuous and often excruciating.	3. Pain intermitting.

There are others, but these are the most important, and sufficient as a guide, though they may be found to vary in practice and call for the exercise of caution and judgment.

It will be seen from the foregoing that the first indication is local treatment. The pulp canal or chamber should be opened, all the decaying animal matter removed, and the parts disinfected with creosote, or a solution of carbolized oil, one part to twenty. If, however, the tooth is intolerably sore, as it will be sometimes, an opening sufficient to allow the gases to escape, will answer for the first call. This, followed by the application with a camel's hair pencil of equal parts of tincture of iodine and aconite upon the gum along the course of the root, will often be found to give immediate relief, and in a day or two the soreness will have subsided so as to admit of enlarging the opening, and the subsequent cleansing of the pulp chamber and roots may be painless.

In the constitutional treatment in such cases, it has been my custom to give a mild saline purgative combined with full doses of bromide of potassium, and I have reason to believe, with the best results: one to two grammes of bromide of potassium or sodium, which cuts off the blood supply, and thus starves the disease. This, with a third or a half of a bottle of citrate of magnesia, for an adult, to act gently upon the bowels, will usually cut short a case of periodontitis if seen in the early stages. If it be necessary to repeat the bromide, I should recommend giving it in gramme doses three times a day. In these cases the excretory functions, both of the skin and bowels, will usually be in a sluggish condition, and it will be good treatment to restore the normal activity in this direction as speedily as possible. We are not always successful in doing this, however, and the disease runs its course to suppuration in spite of all that can be done. The face begins to swell, and sometimes assumes alarming proportions with varying degrees of pain. Our efforts must now be addressed to relieving the pain and making the patient as comfortable as possible, at the same time doing all we can to promote suppuration. There is one rule, however, that may be emphatically laid down: that whatever is done in this direction, a poultice should never be applied to the *outside* of the face, except in the first stage to relax and relieve stasis, or you may have the mortification of seeing the abscess point and open externally, and an unsightly scar the result. Applications may be made on the *inside* of the mouth about the root of the affected tooth with benefit.

At times, and especially where abscesses form in the lower jaw, they will burrow into the tissues and between the muscles and fasciæ, and point externally in spite of all our efforts. It is best in these cases to open early, as soon as the pus can be located, and as low down under the chin or jaw as possible, thus avoiding a ragged scar. These abscesses are sometimes exceedingly obstinate and troublesome, especially where the patient is run down in general health, or has any inflammatory diathesis; they may extend into the surrounding tissues, involving the osseous structures, setting up necrosis therein, impairing the function of the fifth pair of nerves, and giving rise to chronic facial neuralgia, together with general constitutional disturbance and permanent impairment of health.

Another point that should be emphasized in the treatment of these cases is not to advise extraction during the acute inflammatory stage of the disease; by so doing the pain is often increased rather than allayed, and it does not always stop the formation of the abscess, and this forming *after* the extraction of the tooth, the impression is apt to arise that it has been caused by unwarrantable interference; on the other hand, if you make your patient as comfortable as possible until the acute stage is past and pus has formed, you may then, with the use of the lancet or the forceps, contribute very materially to the comfort of your patient, and leave a pleasanter impression from the fact that from that time the symptoms subside.

I have selected a few cases from among those which have come under my observation within the last few years, as a better means of setting forth the symptoms, and the method of treatment which it has been my custom to adopt.

CASE 1.—Right superior central incisor tender on percussion, darker than surrounding teeth; tissues tender about the apex of the root. With a small drill an opening was made into the lingual surface of the tooth at about the median line, and just below the margin of the gum; this soon entered the pulp chamber as was known by the sinking of the drill into the cavity. There is no pain in doing this, except from the tenderness of the tooth in its socket, and this may be lessened by pressing firmly upon it and keeping the drill going continuously until completed.

The nerve was found to be dead as was anticipated. The subsequent treatment was simple, as the soreness subsided in two or three days, and the pulp chamber and root were cleansed and filled.

CASE 2.—Had been suffering for three or four days, at times intense pain. Face much swollen, bowels constipated, tongue heavily coated, no sleep in twenty-four hours. Examination reveals abscess opposite one of the buccal roots of the first superior molar; fluctuation marked. By incision a quantity of pus was discharged, bringing immediate relief. A few days afterward the roots of the tooth were cleansed and filled as in the preceding case. At this, the *suppurative* stage, if the tooth is useless it may be removed with benefit, the extracting serving the purpose of the lance, as it will usually be found that the sac of the abscess is removed with the tooth.

CASE 3.—A girl about twelve years of age, with a fistulous opening in the cheek opposite the carious roots of the left inferior first molar. There was a fungoid growth about the size of a silver half dollar surrounding the fistula. The history was as follows: About three weeks before, the face began to swell, and her mother had poulticed it (following the advice of a friend). I at once took the poultice off, gave the little sufferer nitrous oxide gas, and removed the roots. In a few days the abscess ceased discharging and the fistula closed.

There was a deep scar after healing which can be obliterated only by a plastic operation—a striking warning against the external use of poultices in such cases.

CASE 4.—Complicated with necrosis. This abscess, from its history, was undoubtedly induced by an overcrowding of the dental arch. The patient—a man 25 years of age—had been troubled for nearly a year with pain in the region of the left inferior third molar; sometimes the muscles were so rigid that he could scarcely open his mouth. A week before I saw him the third molar had been extracted. It was a sound tooth apparently, but pus had been discharging around it for some time. The face was much swollen and the pterygoid and masseter muscles rigid. An examination revealed pus discharging from the socket of the extracted tooth and the second molar very loose. The socket was syringed out with tepid salt water, and a few drops of fifty per cent. solution of aromatic sulphuric acid injected into it, and the patient put upon thirteen centigramme doses of sulphate of quinia three times a day. I saw the case the second day afterward and there was no improvement, the pain being constant. I then removed the second molar which seemed to have no connection with its socket whatever, and exploring with a probe lifted out a sequestrum which comprised a large portion of the alveolar wall of the extracted teeth. I then added to the former prescription six centigramme doses of sulphide of calcium. The pain ceased in a few hours and the swelling subsided rapidly. About one week after, the patient presented himself again, with all the symptoms returning. With a probe I discovered the presence of another sequestrum, and with a burr in the dental engine, burred off as much as possible of the dead tissue, being careful not to encroach upon living territory. As I left town the next day, I referred him back to his family physician, who informs me that a few days afterward the remainder of the sequestrum came away, and the patient entirely recovered.

Case 5.—Woman, thirty years of age. Had had the characteristic symptoms of disease of the antrum for more than a year past; at one time during this period, had received hospital treatment for malarial fever; the constitutional symptoms being marked, but the local difficulty—evidently the primary cause of her illness,—was, so far as information could be obtained, entirely overlooked. Some three months before I saw the case, she had the left superior first molar extracted, but the face still continued swollen and painful, with a feeling of heaviness on the swollen side. I diagnosed disease of the antrum of Highmore, and with a large-sized drill, opened into the cavity through the socket of the extracted tooth. The antrum was then cleansed with a strong solution of chloride of sodium, evacuating a large quantity of thick, fetid pus. Fifteen drops of wine of opium were then injected to control the pain, and tonic doses of quinine with sulphide of calcium were given.

The second day the pain had entirely ceased, but there was still a free discharge of pus. From this time the cavity was washed out every other day for two weeks with the chloride of sodium solution, followed by the injection of about four grammes of a ten per cent. solution of chloride of zinc; at the end of that time all the symptoms had abated.

Case 6.—Chronic irritation of the right inferior dental nerve extending to the symphysis, and involving the whole right facial region. Examination of that side of the face revealed nothing abnormal. The first and second molar teeth had been removed some years before. There was no discoloration of any of the remaining teeth and *all* were alike sore and tender on pressure during the attacks. Every two or three months there was soreness of the face, extending to the symphysis menti, but at no time were the symptoms severe, but annoying and neuralgic.

There was a small piece of the enamel broken from the side of the cuspid and lateral incisor, but as there was no discoloration of these teeth, this was passed by without any serious thought, and the case treated on general principles at each recurrence of the symptoms. On one of these occasions it occurred to me to try if there was sensation in the cuspid, the tooth having the largest piece of enamel broken from it, and to my surprise and great relief, the drill passed directly into the pulp chamber without producing the slightest pain. The pulp being dead and almost wholly absorbed, it required but a short time to finish the work almost completed by nature, since which time there has been no recurrence of the symptoms. Upon being questioned, the patient stated that, when a child, she had fallen and struck the front teeth, breaking off the small bits of enamel, and that this tooth was sore for a few days, though not seriously troublesome.

I refer to this case of irritation of the dental nerve as a possible solution to some other cases of persistent facial neuralgia. Observations extending over the last twelve years have taught me that many cases of facial neuralgia may be traced to the mouth and teeth, neglect of these or unskilful operations upon them being the primary cause. The family physician is supposed to be interested in all matters which pertain to the welfare and functions of the different organs of the body, and will be called upon to advise in this, as well as in other cases, and should not underrate the importance of giving careful and explicit directions in order to obtain for his patients the highest of all considerations in medicine or surgery—that of prevention of disease. In the mouth this may be done: First, by cleanliness. Second, by preventing overcrowding of the teeth, a most fruitful source of decay and consequent trouble and expense of filling or plugging. It is better to sacrifice one or two sound teeth, at the right time, to relieve this condition of things, than that they should remain and jeopardize the whole set. Third, early attention to any cavities which may require filling, instead of waiting until the cavities have assumed such proportions as to render the operation extremely painful, and the result somewhat doubtful. Frequent examinations should be made—at least once in six months—especially from the sixth year, the time of the eruption of the first permanent molars, until adult life, and any imperfections remedied as far as possible.

It is too often the custom to wait until some note of warning is sounded, in the shape of a sleepless night, before consultation is had upon the subject, and then what might have been a simple thing has become a formidable one, and if the patient is a child, a dread is established which it is not easy to overcome, and thus other teeth are neglected and lost. It is safe to say that over one-half of the troubles and suffering which children endure, even with their deciduous teeth, might be avoided, by promptly filling with some form of plastic material. It is a common impression that once the nerve of a tooth is dead, that tooth cannot trouble any more; that this is an error has been before stated in effect. It is then that alveolar abscesses begin.

A STUDY OF SEVENTY-EIGHT CASES OF FRACTURE OF THE HUMERUS NEAR THE ELBOW-JOINT.

JOHN A. RAY, M.D.

As a contribution to the study of injuries of the elbow-joint, and with special reference to the question whether deformity and partial anchylosis are inevitable consequences of such injuries, I desire to present the results of the cases that have come under my own observation.

Dr. Norris says: "All fractures about the elbow are serious and troublesome accidents, and to treat them well requires much care and attention. Whatever method may be chosen, deformity is frequently seen after them, and however successfully treated they may be, a degree of stiffness is left about the parts which requires some time for its removal."

A total of seventy-eight cases have come under my observation during the past six years. Of these seventy-one were the result of railway injuries, and seven in private practice. Nineteen were under my own care. Many of them received other injuries besides that of the elbow, but of this joint there were:

Twenty-seven fractures of the internal condyle.

Thirty-four of the external condyle.

Nine of both condyles.

One of both condyles complicated with dislocation of the ulna and radius backward.

One of the shaft above the condyles.

Two of the external condyles with the olecranon process of the ulna.

Four cases of fracture of the internal epicondyle.

These cases were tabulated for the most part from injuries received by the employees of the Erie Railway, and it is from the surgeons of the Surgical Bureau of this company that I am able to give you the result of the treatment of the cases I have just quoted.

Of the seventy-eight cases, the subsequent history of sixty-one has been obtained, leaving seventeen cases unaccounted for. Of these sixty-one cases, the four cases of fracture of the internal epicondyle, left no appreciable deformity. In all of the remaining fifty-seven cases, there was an appreciable amount of deformity, varying from a very slight degree to an extent that made the arm almost useless. As these cases had to pass through my personal inspection before vouchers could be drawn for their pay, my attention was early drawn to the existing deformities, and I began to give this class of injuries close and careful attention.

The cause of the deformity, in my opinion, is to be found more in muscular contraction and the form of splints used, than in all other influences combined. So far as it has been possible to determine it, all except twelve of these cases have been treated by the use of various side splints, by simply resting the arm in a sling, or letting it lie on a pillow, and in every case the arm was fixed. In twelve cases the arm was put up in permanent dressing of plaster of Paris, and in these twelve cases there was the minimum of deformity. Five of these were put up in the flexed position; the remaining seven were dressed in the extended or very slightly flexed position. In these cases the deformity was so slight as to require close examination to see it.

The deformity will depend upon the size of the fragment and upon the extent of the solution of continuity of the ligamentous tissues surrounding the joint. In case of fracture of the external condyle, from which arise the supinator longus and the common tendon from which the extensor muscles arise, or a fracture of the internal condyle, from which arise the great pronator muscle and the flexors of the arm, movement of these muscles must have a tendency to displace the fragments. We are commonly taught that the origin of a muscle is its most fixed point. Now, if either condyle is fractured, the muscles arising from it have no fixed point, and will contract equally until the fragment be fixed by the adjacent tissues, then the muscles continuing to contract will perform their physiological function, though with some pain at the point of fracture.

Another point connected with the physiology of these parts, and one that ought not to be lost sight of in the treatment of these fractures—the flexor and extensor muscles antagonize each other, and a certain tension must be maintained between them, or the one will overcome the other. This involuntary action of the muscles is, I apprehend, the most frequent cause of the deformities following fractures at the elbow-joint. The treatment of fractures of the elbow-joint, as given by writers upon surgery, is for the most part to place the arm at a right angle with the body, and to support it with *side splints*. Most authors prefer to have them made of material that will readily mold to the arm, as gutta percha, leather, pasteboard, etc.

Dr. Norris recommends first putting the arm up in a right-angle splint, and after the first few days frequently changing to a more obtuse angle, until finally the arm can be brought straight, and then to gradually bring the forearm again at a right angle with the humerus. This will, he says, with the exercise of great care and attention, prevent deformity and more effectually hinder anchylosis.

I have seen two cases treated with splints having a joint at the elbow admitting of flexion and extension, but I believe better results can be obtained by a more simple contrivance. In my opinion the only form of dressing that should ever be used is one of the permanent splints, which can be accurately molded to the arm and is of sufficient strength.

In the treatment of fractures of the elbow-joint, two things are to be kept in mind; to reduce the local deformity, and to make extension as perfect as possible. The first can be obtained by fixed splints, and the second by putting the arm up as much extended as is consistent with the perfect coaptation of the fragments. No side splints can so well support the arm as do the fixed, where not only the fragment is held in place, but the muscles are also well supported, and the fragment less drawn upon by the involuntary contraction of the muscles.

If the arm be placed in a permanent splint, though it is at a right angle, the deformity will be less than if any other form of splint be used. But inasmuch as complete extension is usually interfered with, the best results can only be obtained by placing the arm in the extended position, or as nearly so as can be done without pain. This rule, I think, should apply to all those cases in which one would not naturally expect to get permanent and complete anchylosis.

A word as to how long splints should remain upon the arm before passive motion should be commenced: Ferguson and Cooper recommended, for a child, three weeks, and, for an adult, four weeks. Dr. F. H. Hamilton thinks that within seven days, and perhaps earlier, passive motion must be commenced, and persevered in daily until a cure is obtained. He further says that in the majority of these cases, it is better not to resume the use of splints after this period. For, though no bony union has taken place, the effusion has somewhat steadied the fragment, and the danger of displacement is lessened, while the prevention of anchylosis demands very early and continued motion.

In *all* of my own cases, in which I used the permanent splint, I have left them up from four to six weeks. But I do not believe that any harm can result from removing the splint and examining the joint at any time, if it be immediately replaced so as to keep the arm quiet.

There is always a little stiffness of the joint after the splint is removed, which soon wears away. In those cases in which the arm was extended, the motion of the joint was more perfect and free than those placed at a right angle. The reason of this is quite apparent, for the muscles of flexion are more powerful than the extensors. Flexion is the more natural movement, and the one most indulged in, and the one in which the patient will of necessity be compelled to exercise in order to accomplish the various movements necessary to his comfort and well-being.

In conclusion I would state that my usual mode of putting these fractures up, is with plaster of Paris, in bandages made of mosquito netting. This makes altogether the smoothest and best dressing, and can be prevented from rubbing off on the patient's clothes, by giving it a finishing coat with the white of an egg. And when made of this matèrial, it is much less troublesome to remove than when muslin or other fabric is used. And it is also my practice to fix the wrist with the dressing so as to limit the use of the hand, as I believe these movements serve in a measure to occasion deformities, more especially if the fragment be large.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

VIII.—RICHARD WISEMAN.

1625—1686. (?)

FOR centuries England was far behind all the countries of Europe in its contributions to surgery. No surgeon of great eminence preceded Richard Wiseman, serjeant-surgeon of Charles II, and no worthy work on the subject appeared previous to his "Several Chirurgical Treatises," a grand folio of nearly six hundred pages, printed at London in the year 1676.

Thomas Gale, surgeon in the army of Henry VIII, had published in 1563 a small volume with the title, "An Institution of a Chirurgeon," together with some other tractates. William Clowes, a naval surgeon, in 1591 issued "A Proved Practice for all Young Chirurgeons, concerning Burnings with Gunpowder, and Wounds made with Gunshot, Sword, Halberd, Pike, Launce, or such other." Peter Lowe in 1597 published "A Discourse on the whole Art of Chirurgery." In 1617, John Woodall gave to the world "The Surgeon's Mate." These small treatises constituted the bulk of English surgical literature at the time Wiseman flourished. They were elementary, and contained little more than a repetition of the pathological absurdities and therapeutical crudities which characterized the surgical writings of that day. They have long since passed into oblivion; they have left no maxims for future generations; they but poorly served their day, and now, the few copies which remain of them are bored by two species of book-worms, quaint and worthless relics of a bygone day.

Wiseman was a man of genius, of acute perception, and of ample experience. He has been styled, not inappropriately, the Ambroise Paré of the Brittanic nation. "His collection of treatises," says Renouard, "has always preserved its interest as one of the most precious monuments of English surgery."

He was matured amidst the horrors of the civil wars of Cromwell, had a long service and experience as a military and naval surgeon, and thus acquired a reputation and eminence such as few have ever attained—even when aided by genius and opportunity. His ability and skill were duly recognized by Charles II, who made him his serjeant-surgeon. He settled in London, and practised his art with great distinction for many years.

In his "Epistle to the Reader," dated May 24, 1676, he refers to his protracted ill health, during which long period he prepared his treatises for the press. "In doing this, Reader, I have made a vertue of necessity, and employed those hours for the publick service, which a frequently-repeated Sickness hath for this twenty years last past deny'd me the use of in my private occasions. It hath pleased God by casting me into such a condition to give me opportunity of reading and thinking as well as practicing. Both which are necessary to the accomplishment not only of an Author, but indeed of a Chirurgeon. I cannot be so uncharitable to my Brethren, as to wish them the like Sickness, to oblige them to the like Retirements for contemplation and study. But I do heartily wish, that what was necessity in me may be choice in them."

I have been unable to find many particulars relating to the life of Richard Wiseman. Not even the time and place of his birth or death are given in any of our biographical, bibliographical, or historical works. I have gleaned a few facts from his works, which he has incidentally stated in the narration of some of his cases. It appears that he was first known as a surgeon in the civil war of Charles I; that he accompanied Prince Charles when a fugitive in France, Holland, and Flanders. He "served in the King of Spain's navy" three years (second edition, 1686, p. 501). He returned with the prince to Scotland and entered the army as a surgeon. He speaks of being present at several battles and sieges. He was taken prisoner at the famous battle of Worcester, September 3, 1651. He refers to this in relating a case of gunshot wound, of which he says: "Whilst I was a Prisoner at *Chester*, after the battel of Worcester, I was carried by *Col. Duckensfield's* order to a man, that out of much zeal to the *Cause*, pursuing our scattered forces, was shot through the Joint of the Elbow." (*Op. cit.*, p. 454.) Six weeks after the injury, Wiseman amputated the arm, "the Patient not so much as whimpering the while;" he adds: "Then having procured a Pass to come to *London*, I hastened away." He also refers to being at the "Seige of Weymouth" (p. 455), in the account of a case of amputation. "Two days after, our men were chased out of the Town and

Chappel-fort;" he was at the moment engaged in dressing the wounded, when he heard "a woman cry, 'Fly, fly, the fort is taken,'" whereupon he sped off with a patient having "a stumped arm, who outran me quite," yet he afterward cured him. His works abound in little incidents of this sort, related in connection with not less than six hundred interesting surgical cases derived from his own personal experience. These are all stated clearly, concisely, more or less quaintly, and with evident candor, since he records his failures as well as his successes.

His treatises were long held as standard authority in the examinations at Surgeons' Hall. They are well worthy of perusal at the present day. The reader will find in them, not only the germs of surgical principles which are now established, but also plans of practice which are generally believed to have been the result of recent thought and experience. Among the important surgical maxims laid down by this wise-man is one which was the subject of much discussion during the recent campaigns of the Crimea, the Franco-Prussian war, and our own stupendous Rebellion, viz., the practice of immediate amputation. It has taken two centuries to fully confirm the maxim distinctly laid down by Wiseman in the following words: "In heat of Fight, whether it be at Sea or Land, the Chirurgeon ought to consider, at the first dressing, what possibility there is of preserving the wounded Member; and, accordingly, if there be no hopes of saving it, to make his Amputation at that instant whilst the Patient is free of Fever," etc. Then follow many practical indications for prompt action (p. 451).

The importance of posture in the reduction of hernias, elevation of the hips, even standing the patient on his head, have been recently discussed and cases recorded to show the value of these procedures. It is interesting to know that Wiseman, two hundred years ago, practised the same, and also operated by incision for strangulated hernia.

The patient "may, if occasion require, be carried to and fro upon the back of a strong man, with his head downward, by which the prolapsed bowels are often reduced. Mr. Smith, the truss-maker, told me he had made such an engine, by which he set them on their heads, and thereby had reduced many, which could not otherwise be relieved. But the aforesaid ways, I bless God, have served the most deplorable patient laboring of these diseases under my hands. Yet, if it should so happen, that all endeavors of this kind prove ineffectual, and the patient's life be threatened by frequent vomitting and inflation of the *Abdomen*, and nothing pass through him by stool—I would ask whether, in such a case, it be not more reasonable to offer in consultation the laying open the Production, while there is strength, than to suffer the patient miserably to perish under the disease. I refer to the judicious artist, there seeming nothing of difficulty or danger in the work; yet would not have it attempted whilst there is hope of otherwise reducing it." (p. 152.)

Wiseman was in the habit of dressing wounds with pins and thread, or the twisted suture, as used in hare-lip operations; wherein we see the valuable principle of metallic sutures in surgery.

After finding so much evidence of good common sense in all other matters, it is indeed very surprising that Wiseman should have been so superstitious, or so susceptible to royal influence, that he was not only a strong witness but a zealous advocate of the cure of scrofula "by the King's Touch." The first chapter of his "Treatise of the King's Evil," is devoted to its cure by the laying on of the king's hand, which he styles a "stupendous power," compared with which all that he has written and directed "will do little more than show the weakness of our ability;" that "his Majestie cureth more in any one year, than all the Chirurgeons of London have done in an age." (p. 247.)

When we take into consideration that his sovereign and patron, Charles II, was the most famous of all the kings of England in regard to this gift, and that he *touched* from two to over eight thousand scrofulous persons annually for many consecutive years, it must be admitted that Wiseman had ample opportunity to observe, not only the vast prevalence of this disease, but also the results of this most extraordinary method of treatment.*

He thus expresses his opinion and confidence in the practice:

> "I myself have been a frequent eye-witness of many hundreds of cures performed by his Majestie's Touch alone, without any assistance of chirurgery; and those, many of them, such as had tired out the endeavors of able chirurgeons, before they came thither. It were endless to recite what I myself have seen, and what I have received acknowledgments of by letter, not only from the several parts of this nation, but also from Ireland, Scotland, Jersey and Gernsey. It is needless also to remember what miracles of this nature were performed by the very bloud of his late Majesty of blessed memory, after whose decollation by the inhumane barbarity of the Regicides the reliques of that were gathered on chips and in handkerchiefs by the pious devotees, who could not but think so great a suffering in so honorable and pious a cause would be attended by an extraordinary assistance of God and some more than ordinary miracle. Nor did their faith deceive them in this point, there being so many hundred that found the benefit of it. If this dead bloud were accompanied with so much of virtue, what shall we say of his living image, the inheritor of his cause and kingdom? whom, though it has pleased God to deliver out of those dangers which overwhelmed his royal

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* From the official registers, kept by Thomas Haynes, Esq., Serjeant to the Chapel Royal, from May, 1660 to Sept., 1664, it appears that no less than 23,621 persons were touched by the king. Another account kept by Thomas Donkley, Keeper of his Majesty's Closet belonging to the Chapel Royal, from the year 1667 to 1682, both inclusive, the enormous number of 92,107 were touched. The lowest number being in 1681—2,461, the greatest number in 1682, viz: 8,577.

father, yet it was with so long an exercise of afflictions that though (God be thanked) he be not now like to encrease the catalogue of martyrs, yet he may well be added to the number of Confessors. This we are sure, the miracle is not ceased." (p. 247.)

Wiseman was by no means the only surgeon who fully believed in this exquisitely absurd nonsense. Wm. Clowes, surgeon to Queen Elizabeth; John Browne, chirurgeon-in-ordinary to Charles II; Sir Thomas Brown, and many others have left a complete confession of faith in the miracles wrought by the kings of England in the cure of scrofula.

What can be more supremely ridiculous than to recall the events that transpired during the time this mummery was in vogue? Thousands flocking to London from all parts of the realm, crowding in such vast throngs about the offices of the king's physicians, waiting for a diagnosis and certified tickets for admission to the royal toucher, that on one occasion at least, as stated by Evelyn (Diary for March 28, 1684), six or seven were literally crushed to death.

Those who were found to be afflicted with struma were ushered into the august presence of his sacred majesty on the knee of the surgeon of the royal household, while grave ecclesiastics in full canonicals stood around the canopy of state intoning the solemn service, epistle, prayers and benediction. When the chaplain pronounced the incantation, "They shall lay their hands on the sick and they shall recover," the king passed his miraculous fingers over the swellings and foul ulcers; then taking a small gold coin hung on a white ribbon, he placed it on the neck of the patient, as an evidence of "the great charity, piety, clemency, and humility of the dread sovereign," and thus he completed the superstitious farce.

The *Royal Touch-pieces*, made of the purest gold, having the figure of an angel standing with both feet on the dragon, cost the treasury fifteen thousand dollars per annum, and the whole expense of the ceremony about fifty thousand. They were first introduced, as was also the service in the Book of Common Prayer, by Henry VII, who was a great observer of religious forms, and they were continued down to the time of Queen Anne. After the reign of Elizabeth the coin was reduced in size on account of the great number that applied to be touched, doubtless partially induced by this charming little bounty. No inconsiderable virtue was attributed to the gold, as it was said that the disease was likely to return if it was lost. Silver was, however, substituted, and found to be equally efficacious. The practice had the sanction of centuries. The English traced it back to the days of Edward the Confessor, in the eleventh century.

The French go farther and claim that the gift of healing by the touch of their kings was exercised by Clovis I, about the year 481. The practice appears to have been not unfrequently employed in Scandinavia, and to have been derived from the mystical rites of the Druids in curing disease. Naaman's observation that he thought Elisha would stroke his hand over the place, and recover the leper, is a curious and a most ancient instance of the superstition which ascribes the power of healing by the touch to persons of high rank, or of real or reputed sanctity.

There is reason to believe that the world has not yet entirely abandoned this idea, as it is but a few years past that a noted charlatan, by the name of Newton, professed to cure all diseases by the imposition of hands and the aid of holy (?) invocations. His rooms in New York City were crowded by vast numbers of poor, middle class, and wealthy fools.

Any expression of doubt as to the possession of this gift by the king was regarded as high treason. One Thomas Rosewell was tried in 1684 on such a charge. He was found guilty but was pardoned. "William III" (Prince of Orange), says Macaulay, "had too much sense to be duped, and too much honesty to bear a part in what he knew to be an imposture. 'It is a silly superstition,' he exclaimed, when he heard that at the close of Lent his palace was besieged by a crowd of the sick. 'Give the poor creatures some money, and send them away.' On one single occasion he was importuned into laying his hand on a patient. 'God give you better health,' he said, 'and more sense.'" (Hist. of England, vol. ii, p. 480.)

With the accession of the house of Brunswick the practice of healing by the royal touch ceased.

Wiseman's first publications were "A treatise of wounds," etc., *London*, 1672, 8vo. "Experiments made at London for staunching the blood of arteries and veins." *Phil. Trans.*, 1673. "Account of further experiments concerning the wonderful effects of the blood-staunching liquor." *Ibid.* The "Several," or "Eight Chirurgical Treaties" have passed through six editions, viz.: *London*, 1676, folio; second, *London*, 1686, folio; third, *London*, 1696, folio; fourth, *London*, 1705, folio; fifth, *London*, 1719, 2 vols. 8vo.; sixth, with the title of "System of Surgery," *London*, 1734, 2 vols. 8vo.

EDITORIAL DEPARTMENT.

AN ERA OF GOOD FEELING.

Our editorial brethren on both sides of the Atlantic will please accept, one and all, our grateful acknowledgments for the cordial welcome which the ANNALS has everywhere received. It is said that all types of character may be found in every sphere of human activity, but if the counterpart of the famous Lancashire collier is known to medical journalism at all, he certainly has no place on our exchange-list. ("Man a comin', father." "Who is it?" "Stranger." "'Eave 'arf a brick at 'un!") No demi-bricks have ruffled our serenity, or imperilled our editorial crania. The ANNALS has gone to the four quarters of the globe, a stranger, and has been received everywhere as a friend.

This hearty reception signalizes, not so much our own good future, as the more important fact that the silent growth of science is working a beneficent change, through its devotees, in the manners and feelings of the great world of cultivated men. Until a very recent date, scientific writers were unconscious imitators of literary methods which had been in vogue for countless generations. The writings of the scholastics—and theologians, too—were controversial and acrimonious. Their vocabularies bristled with warlike suggestions. "Polemics," says De Quincey, "at present, according to the popular usage, has some fantastic, inalienable connection with controversial theology." So the works of the earlier medical writers often evince a polemic spirit that surprises the genial reader of these later days.

It is only half a century since the "Medico-Chirurgical Review" printed a truculent extract from the "Lancet," and remarked: "We have copied the above as a fair specimen of the 'Lancet.' The mock-heroic bombast, and sentimental lachrymation in the beginning of the passage, can only be equalled by the

Billingsgate ribaldry, and the rancorous vituperation of its conclusion. The idea of the transactions of the Medico-Chirurgical Society acquiring *reputation* by appearing in the 'Lancet,' in company with the 'morbid parts of Dr. Collyer' and other choice morceaux, is so exquisitely ludicrous that our sides were ready to burst on perusing the passage, which must afford no little entertainment to the members of that association."

Again: "Considering the ways and means which the 'Lancet' takes to degrade the profession and vilify its members, through the medium of the public prints, we think it high time for the medical officers of hospitals to adopt precautions against the domiciliary visits of such lawless freebooters."

And yet again: "We advise it to leave off its habits of literary pilfering—to cease pushing its uninvited and unwelcome visage into societies, hospitals and lecture-rooms with the express design of breaking the eighth commandment—to relinquish the office of medical jackal to the newspapers, and pander to the worst passions of human nature—to abstain from vituperating the profession by addressing criticisms and reports to the non-professional public—to post not up its placards with those of Warren's blacking, etc." Evidently Mr. Dickens was no reader of British scientific literature, or he would never have crossed the Atlantic in order to find a suitable habitat for the "New York Sewer."

We do things better now. In dealing with facts, we cease to care for personalities. The scientific mind realizes that

> "There is no great and no small
> To the Soul that maketh all."

The struggle for supremacy of influence has given place to the desire for excellence of achievement. Hamilton writes to Wight: "My dear doctor: I have done you and science an injustice, and I make haste to repair the wrong." And, "under a sky full of eternal eyes," each manly worker is content to do his part as best he can, and leave the rest to time.

THE CLINIC.

1. **CARIES OF VERTEBRÆ.**—Death. **GRAY.** Patient æt. 64. Nineteen months previous to death, was suddenly seized with stabbing pain after being in profuse sweat and cooling rapidly. Marked anæsthesia of chest and abdomen, though on one side pain was severe, constant, and unrelieved by opium. Spinal flexion and extension painful; and great tenderness over two upper dorsal vertebræ, pressure upon them giving pain in front of chest. Hasty micturition. Pain in back relieved by acupuncture, that in chest continued. Patient now passed into other hands, and developed pulmonary symptoms with nummular sputa, dying in a few months of exhaustion. Autopsy.—Complete erosion of body of second dorsal vertebra, and a shell-like condition of adjacent bones. Upon the spinal meninges were two connective tissue growths, each about 5 cm. in circumference. A cavity in lung of each side corresponding with vertebral disease, through which pus was discharged.

2. **SPASM OF GLOTTIS. TRACHEOTOMY.** Recovery. **P. L. SCHENCK.** Kings Co. Hospital. S. A., æt. 28. Had primary syphilis eight months ago which healed, leaving long prepuce in a state of chronic œdema; otherwise robust and healthy man. June 10th, circumcision. After inhaling Squibb's ether for twenty minutes without difficulty, and just after skin was removed, had a general convulsion accompanied by closure of glottis. After intense but ineffectual efforts to inspire, patient ceased breathing. Cyanosis and cold sweat. Life apparently extinct. Trachea promptly opened below thyroid with two strokes of scalpel. Air at once rushed in, and in a few moments breathing was restored, and cyanosis disappeared. Wound held open by tenacula till spasm was past. Hemorrhage slight. Wound closed with horse-hair sutures. Patient now well.

3. **CERVICAL TUMOR. DODGE.** Recovery. Mrs. S., æt. 24. Has had a large tumor over parotid for six years, and for last few months accompanied by pain and paralysis Five years ago an operation was attempted but abandoned. May 27th, removed by careful dissection, as it was firmly adherent to condensed tissues in vicinity. No hemorrhage. Tumor complex, irregularly lobed, cartilaginous; measures 9 x 10 cm. Operation followed by anæsthesia of face, paralysis of lip, etc., which, by June 15th, have completely disappeared. Wound dressed simply; healing rapid.

ERRATA. In report of Mammary Cyst, June Clinic, instead of 28.5 centimetres, read 73 centimetres; instead of 20 centimetres, read 51 centimetres.

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ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

SOME POINTS IN THE ANATOMY OF THE ENCEPHALON.*

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MY object in preparing these notes is to draw the attention of the Society to some of those points in the anatomy of the encephalon, which have a direct bearing upon the pathology, symptoms and diagnosis of injuries of the head. They relate mainly to the circulation, with the lesions of which surgeons have constantly to deal.

We shall begin with a brief review of the divisions of the hemispheres into lobes and convolutions; then describe the anatomy of the cerebral vessels, the structure of the inner membranes, and perivascular sheaths; concluding with a short sketch of the physiology of the intracranial circulation.

It will not be necessary to give any more than a short review of the principal lobes and convolutions, as Prof. Dalton has already treated that subject very fully in his paper published in the ANNALS, vol. ii, pages 1–18.

Figs. 1 and 2 are drawings of the external and internal surfaces of the left hemisphere of a brain* in which the convolutions were poorly developed, and which for that reason serve to illustrate those fundamental divisions which are always present in the normal cerebrum.

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* Delivered before the Society, May 17, 1880.

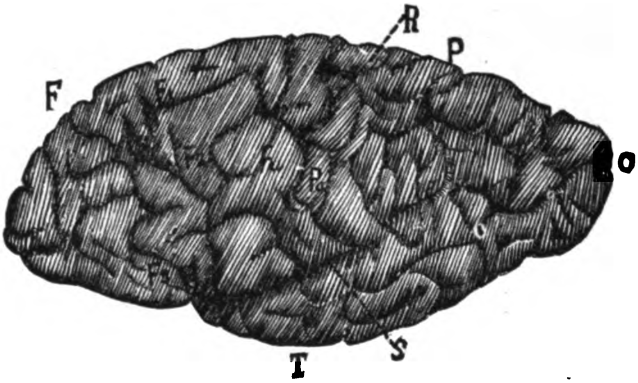

FIG. I. EXTERNAL SURFACE OF HEMISPHERE.

S, Fissure of Sylvius; *R*, Fissure of Rolando; *F*, *P*, *O*, *T*, Frontal, parietal, occipital and temporal lobes; F_1, F_2, F_3, first, second and third frontal convolutions; *Fa*, ascending frontal, *Pa*, ascending parietal convolutions.

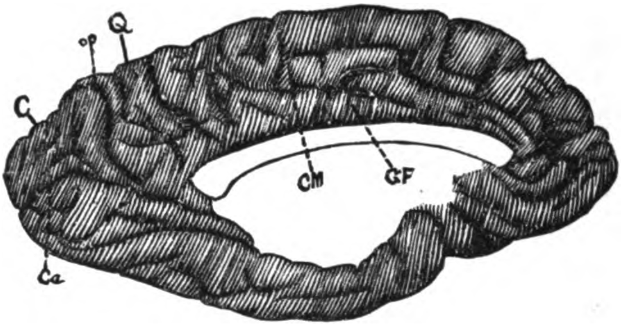

FIG. 2. INTERNAL SURFACE OF SAME HEMISPHERE.

CM, Calloso-marginal fissure; *op*, Occipito-parietal fissure; *Ca*, Calcarine fissure; *GF*, Gyrus fornicatus; *C*, Cuneus; *Q*, Præcuneus.

On the external surface (fig. 1.) is seen the fissure of Sylvius (*S*) running backward and slightly upward as far as the junction of the middle and posterior thirds of the cerebrum. Its anterior branch is shown at *Sa.* The fissure of Rolando or *central fissure* (*R*) runs from the anterior portion of the fissure of Sylvius, upward and backward to the median edge. In well-developed brains where the frontal lobe is highly developed, this fissure is directed more obliquely backward, and its upper extremity is in a line posterior to the termination of the fissure of Sylvius.

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* Removed from a woman about 40 years old; weight 35 oz.

Three fissures are shown on the median surface (fig. 2).

First, the calloso-marginal fissure (*CM*) which passes upward and backward from near the corpus callosum to the superior margin of the hemisphere. Second, the occipito-parietal (*op*), running perpendicularly near the posterior extremity of the brain; and third, the calcarine (*Ca*), running upward and backward from the inferior extremity of the occipito-parietal to the point of the hemisphere.

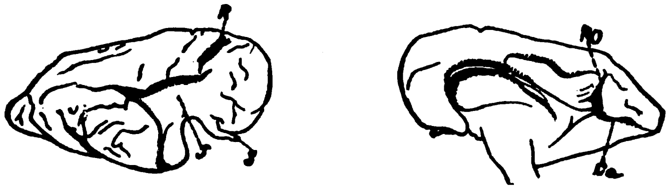

FIG. 3. EXTERNAL SURFACE. FIG. 4. INTERNAL SURFACE.

RIGHT HEMISPHERE OF THE BRAIN OF A FŒTUS AT ABOUT THE FIFTH MONTH OF GESTATION.

S, the fossa of Sylvius; *R*, the fissure of Rolando; *PO*, the occipito-parietal fissure; *Ca*, the calcarine fissure.

All these fissures make their appearance early in fœtal life. Figures 3 and 4 show the outer and inner surfaces of the right hemisphere of a human fœtus at about the fifth month of gestation. The letters are the same as in the two preceding figures.

All that portion of the cerebrum which lies in front of the fissure of Rolando and above the fissure of Sylvius is the *frontal lobe* (*F*). That portion which extends from the fissure of Rolando backward to the occipito-parietal fissure on the inner surface, and to the line corresponding with that fissure upon the outer surface, is the *parietal lobe* (*P*). The *temporal lobe* includes everything below the fissure of Sylvius, and as far backward as its posterior extremity. The *occipital lobe* lies behind the occipito-parietal fissure.

On the inferior surface there is no distinct division between the temporal and occipital lobes, but a line corresponding to the anterior edge of the tentorium is taken as the theoretical boundary. On the internal surface the district in front of the calloso-marginal fissure is known as the *paracentral lobe* (*PC*), because it is in the neighborhood of the central fissure (fissure of Rolando). The cubical area between the calloso-marginal and occipito-parietal fissures is the *præcuneus* (*Q*), and that wedge-shaped portion of the occipital lobe which is included between the occipito-parietal and calcarine fissures, is the *cuneus* (*C*).

The convolutions of the frontal lobe are four in number: F_1, F_2, F_a, F_3.

The first (F_1) lies adjacent to the great longitudinal fissure, and is bounded externally by a deep sulcus which runs forward from near the upper end of the fissure of Rolando. There are a varying number of smaller, more shallow sulci, subdividing the convolution, but the one which limits it externally may be known by its greater depth and by the constancy of its presence. The third frontal convolution (F_3) is readily identified. It skirts the margin of the anterior branch of the fissure of Sylvius.

The second frontal (F_2) includes all the convoluted mass lying between the first and third. It is wider than the others and more complicated in its appearance. The remaining convolution of the frontal lobe (F_a) lies in front of the fissure of Rolando and is the anterior of the two convolutions referred to above as bounding that fissure. It runs from the inferior or external margin of the lobe, to its superior or internal margin. It is continuous below with the third frontal; above, with the first, while the second runs forward from its middle. It is called the *ascending frontal convolution* on account of its nearly perpendicular direction.

The most important convolution on the parietal lobe is the *ascending parietal*, which bounds the fissure of Rolando posteriorly. It is continuous above with the *first parietal* (p_1), and below with the supramarginal (*sm*). The latter, as its name indicates, courses along the upper margin of the Sylvian fissure.

There are three convolutions in the temporal lobe numbered from above downward (t_1, t_2, t_3).

Three occipital gyri are described: The first, most easily located, passes around the upper end of the parieto-occipital fissure. It is continuous in front with the posterior extremity of the ascending parietal. The second and third lie below it.

On the median surface of the hemisphere a long convolution is seen, following the course of the section of the corpus callosum and lying just above it; it is the gyrus fornicatus, one of the first recognized as a distinct formation.

The continuation downward and forward from its posterior extremity corresponds to the hippocampus major in the lateral ventricle, and is named the gyrus hippocampi. Finally, by opening the fissure of Sylvius, an isolated group of convolutions—the island of Reil—is brought to view.

The topography of the basal ganglia has already been fully described by Dr. Dalton. Their situation with relation to the parts at the base is shown in Fig. 6.

The arterial supply of the brain is derived from two sources, the internal carotids and the vertebrals. The carotids supply the frontal lobes, the anterior and external portions of the temporal, the island of Reil, the regions bordering upon the corpus callosum, the optic commissure and structures in its vicinity, the lenticular and caudate nuclei, and the anterior portion of the optic thalami. The vessels distributed to this extensive area are known, collectively, as the *anterior* or *carotid system.*

The vertebrals furnish blood to the occipital and portions of the parietal and temporal lobes, to the peduncles of the cerebrum, to the posterior portion of the optic thalami, to the corpora quadrigemina, and to the cerebellum, pons and medulla. The arteries derived from this source form, collectively, the *posterior* or *vertebral system.* The two systems, anterior and posterior, are connected at the base of the brain by the posterior communicating arteries.

The internal carotid artery, on entering the cranial cavity turns upward and a little backward. It gives off from its anterior surface the *ophthalmic*, which passes forward into the orbit; and from its posterior surface the *anterior choroid* (Ch, Fig. 5) which passes backward under cover of the extremity of the temporal lobe to the transverse fissure, where it is distributed in the choroid plexus. After giving off these two branches, the carotid divides into the anterior and middle cerebrals. The *anterior cerebral* courses upward and forward, disappears between the frontal lobes, and, following the curve of the beak of the corpus callosum, winds around its anterior extremity and runs backward upon its upper surface as far as the posterior end. The arteries of the opposite sides lie close together, frequently in contact with each other. As they pass into the median fissure, about two centimeters in front of the optic commissure, they are connected by a very short branch—the *anterior communicating*. The *anterior cerebral* sends branches to the optic commissure, the lamina cinerea, and frequently to the anterior extremity of the caudate nucleus. It also supplies the corpus callosum and the convolutions of the inner surface of the hemisphere as far back as the cuneus, the first frontal and the inner portion of the orbital convolutions, and the anterior portion of the fornix.

The *middle cerebral* passes outward across the anterior

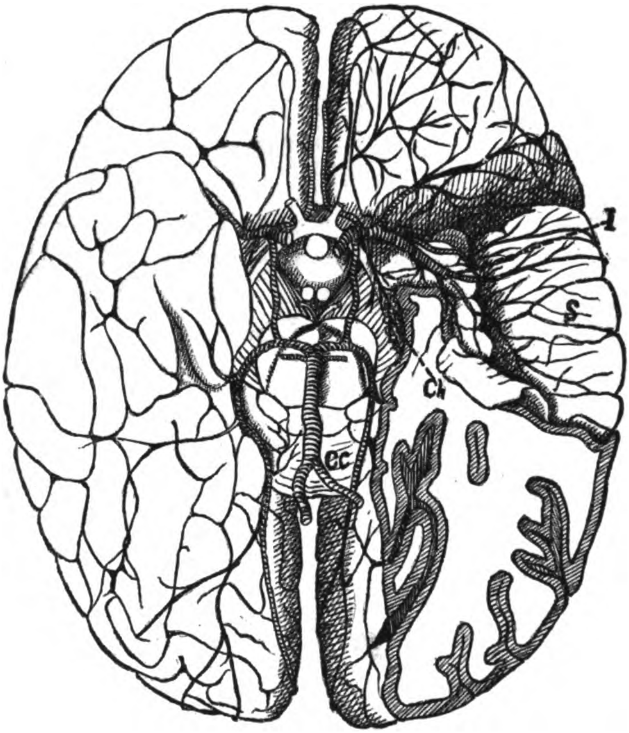

FIG. 5.—INFERIOR SURFACE OF HEMISPHERES, THE LEFT TEMPORAL LOBE CUT AWAY SO AS TO SHOW THE DIVISION OF THE SYLVIAN ARTERY AND THE ISLAND OF REIL.

S.—The roof of the fissure of Sylvius; *Ch.*—The anterior choroid artery entering the choroid plexus; *CC.*—The posterior extremity of the corpus callosum exposed by the removal of the cerebellum. (*I.*—The island of Reil.)

perforated space into the fissure of Sylvius. On reaching the island of Reil it divides usually into four branches, which run forward to the frontal lobe, backward to the temporal, and upward on either side of the fissure of Rolando. Its terminal branches reach as far backward as the termination of the fissure of Sylvius, and superiorly, to the parts lying adjacent to the great longitudinal fissure. This vessel, as it traverses the space between its origin and the island of Reil, gives off from its upper surface numerous small branches which penetrate the cerebral substance, and are distributed to the intra- and extra-ventricular portions of the corpus striatum, to the anterior and external parts of the optic thalamus, and the internal and external capsules.

The *posterior cerebral* artery runs backward and outward, curving around the crus cerebri to the inferior surface of the temporal and occipital lobes, where it follows the course of the calcarine fissure (see Fig. 5). As it crosses the posterior perforated space, it gives off branches which pass upward to the crus and to the inner face of the optic thalamus. Branches also ascend through the peduncles. On the under surface of the crus, a small branch—the *posterior choroid*—is given off. It passes backward to the velum interpositum and choroid plexus, giving twigs to the pineal gland, corpus quadrigeminum and the corpora geniculata. It will be seen from the above that the *posterior cerebral* artery supplies the crus cerebri, optic thalamus, corpus quadrigeminum and corpora geniculata. The *posterior communicating* artery gives off many small branches which supply the tuber cinereum, mammillary bodies, the optic band, and the inner surface of the optic thalamus. Finally, the *anterior choroid* contributes to the nourishment of the optic band and ramifies in the choroid plexus.

It appears from the above description that the great ganglia of the cerebrum are all supplied by branches which are given off from the various trunks which enter into the formation of the circle of Willis. These branches, according to Duret, are given off within a distance of about 2 cm. from the circle of Willis, and form a vascular cirçle which is very appropriately called the *ganglionic* circle.

Figure 6 is a diagram of the base of the brain, showing by dotted lines the projection of the outlines of the ganglia upon the surface. The outer limit of these figures, if connected, would form almost a perfect circle. This effect was not sought for by the draughtsman, and, indeed, was not noticed until the drawing was completed. The diagram was obtained by making a horizontal section of a cerebrum, low enough to cut the lenticular nucleus, and then perforating the brain with styles so as to mark out the limits of the

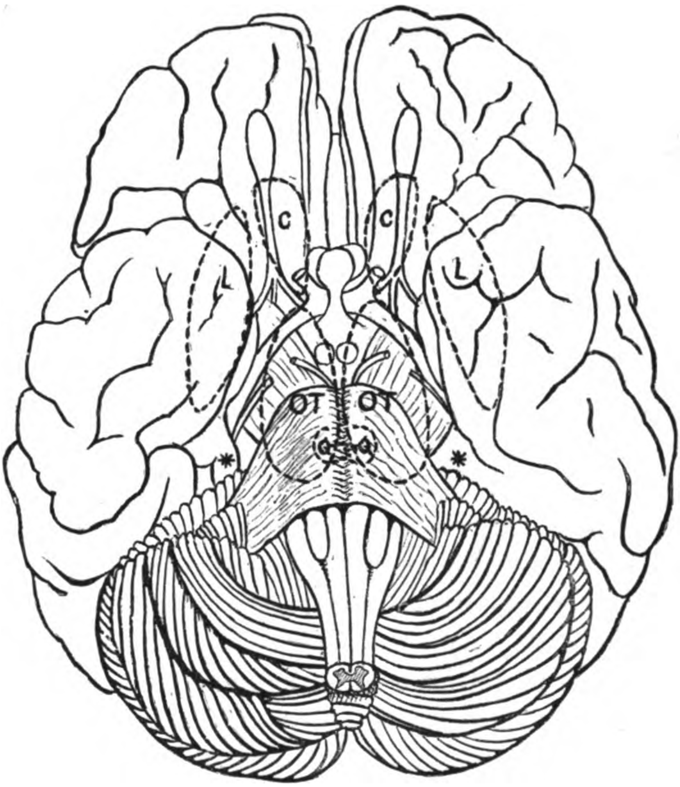

FIG. 6.—DIAGRAM SHOWING THE GROUPING OF THE CEREBRAL GANGLIA ABOUT THE BASE.

The dotted lines show the sections of the ganglia projected upon the base. *C.*—Caudate nucleus; *L.*—Lenticular nucleus; *OT.*—Optic thalamus; *Q.*—Corpora quadrigemina; * indicates the posterior limit of the tail of the caudate nucleus.

ganglia. As the section was made below the tail of the caudate nucleus, its posterior extremity is indicated by an asterisk (*).

Some peculiarities in the distribution of the cerebral arteries remain to be noticed. First, the perforating arteries at the base pass directly upward to their final division into capillaries without any anastomoses. They are *terminal arteries* in the sense in which that term is used by Cohnheim.

Second, the arteries which go to the cortex or surface of the brain anastomose in the meshes of the pia to a variable extent. Duret found that injections driven into branches of one main trunk would in many instances pass over into the area supplied by another trunk, showing that, as far as the larger arteries are concerned, collateral circulation may be established not only by means of the communications at the base, but also through the anastomoses on the surface of the hemispheres. These arteries of the surface break up into small branches which lie close upon the gray matter and send small twigs inward to nourish first the cortex, second the medulla. The nutrient arteries of the cortex are very small and numerous; those which nourish the medulla are larger and much less numerous. These nutrient branches are also *terminal* arteries; they do not anastomose either with each other, or with the arteries which penetrate into the medullary substance from the base. It results from this, that there is a region of the centrum ovale in which there are no arteries. It is simply a capillary district having arteries running up to it from the base, and down to it from the cortex. The diagram (Fig. 7) is intended to illustrate this mode of distribution.

It represents a perpendicular transverse section of one hemisphere. The black line skirting the periphery represents the arteries of the surface, sending off their cortical and medullary branches. Other arteries, mostly branches of the middle cerebral, penetrate the basal ganglia and internal capsule and ascend into the medulla, but do not anastomose with those coming from the surface.

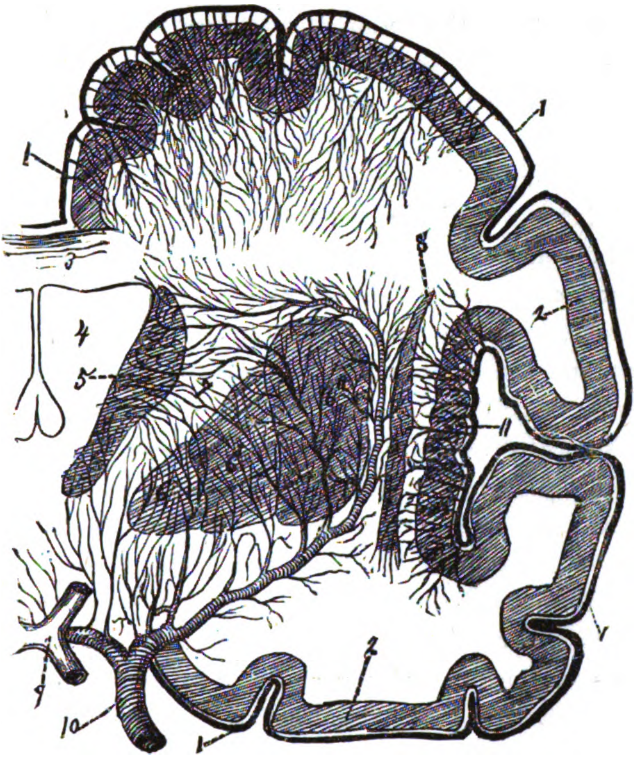

FIG. 7.—DIAGRAM OF A VERTICAL TRANSVERSE SECTION OF THE LEFT HEMISPHERE, TO EXPLAIN THE ARTERIAL DISTRIBUTION.

1.—The arteries ramifying in the pia, and sending off their cortical and medullary branches; 10.—The arteries of the circle of Willis, particularly the middle cerebral, sending branches upward to the basal ganglia; 2.—The gray matter of the cortex; 3.—The corpus callosum; 4.—The cavity of the ventricle; 5.—Caudate nucleus; 6, 6′, 6″.—Lenticular nucleus; 7.—Internal capsule; 8.—Claustrum; 9.—Optic chiasm; 11.—Convolutions of the island of Reil. The branch running between the lenticular nucleus and claustrum is exaggerated in size.

Third, the arteries of the ventricular cavities are of two kinds: those belonging to the choroid plexuses, and those of the velum interpositum. The arteries of the velum, supplied by the posterior cerebrals, give rise to many small branches which penetrate into the substance of the optic thalami and commissures of the third ventricle. A few branches go to the caudate nucleus.*

The arteries of the choroid plexus from the anterior and posterior choroids, on the other hand, afford no nourishment to the cerebral substance, but their many small vessels break up into long capillaries which pass directly over into the venous radicles. Their function, undoubtedly, is to furnish blood for the secretion of the ventricular fluid.

The inner membranes of the brain are so closely connected in many situations that they might with propriety be described as different layers of one structure. In other situations, however, they are separated to a considerable extent, and the intervening spaces are sufficiently large to receive a special designation. In the spinal region the space between them is quite extensive. They must, therefore, be described as separate membranes, though their close relationship should always be borne in mind.

The *pia mater* is composed of two connective-tissue layers, between which the cerebral vessels are placed, running in a network of elastic fibres. Both the outer and inner surfaces of the pia are covered by a layer of endothelial cells. Each cerebral vessel is enclosed in a sheath or tube of light connective tissue lined by endothelium. Where the nutrient arteries pass into the substance of the brain, this sheath is continued upon them. The capillary vessels have a simple endothelial sheath, without any connective-tissue adventitia. The *arachnoid* is also composed of two layers, external and internal. The external layer is made up of bundles of connective tissue covered by a single or

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*Duret states that in two or three instances he has found anastomoses between these and the branches of the Sylvian arteries; indeed, in some cases the caudate nucleus receives the major part of its vascularization from their source. —*Archives de Physiologie*, pp. 86–87. 1874.

double coating of endothelial cells. Its inner layer is made up of loose trabeculæ of connective tissue covered by a single layer of endothelium. The trabecular structures are continuous, with numerous bands passing between the inner layer of the arachnoid and outer layer of the pia. They enclose spaces of various sizes known as the *subarachnoid spaces.* The trabeculæ are covered everywhere by endothelium, and the entire structure, according to Klein, resembles that of the trabeculæ of the omentum.

In certain situations, owing to the peculiarities of shape of the different portions of the brain, the arachnoid is more widely separated from the pia. First, in the longitudinal fissure, the arachnoid does not extend down to the corpus callosum, but leaves a space of considerable size. Posteriorly, between the cerebellum and occipital lobes, and between the cerebellum and medulla oblongata, are other large spaces. The one most commonly observed, however, is that space which is left by the stretching of the arachnoid from the pons and temporal lobes forward to the orbital surface of the anterior lobes. It contains the circle of Willis with its primary branches, the optic commissure, tuber cinereum, mammillary bodies, crura cerebri, and the anterior and posterior perforated spaces. Other smaller spaces are formed by the stretching of the arachnoid across from one convolution to another, those corresponding to the great fissures of the brain being larger than those which accompany the less important sulci.

These subarachnoid spaces communicate with each other on every hand, and with the subarachnoid spaces of the cord. They also communicate, as can be shown by injection, with the perivascular sheaths or canals already described.

There is, further, an opening at the apex of the fourth ventricle, through which the subarachnoid space of the cord communicates with the general ventricular cavity. The existence of this opening was established by Magendie, and it has been called by Luschka the *foramen Magèndii.*

The subarachnoid spaces are occupied by a watery fluid, the cerebro-spinal fluid. It is composed principally of water with a small quantity of saline matter and a trace of sugar. According to Magendie, it varies in amount from two drachms to two ounces. Its quantity is greater in old than in young subjects, and it is gradually imbibed by the surrounding tissues after death. There is, probably, a difference in composition between the intraventricular fluid and that of the subarachnoid spaces, owing to the somewhat different conditions under which it is secreted.*

The arachnoid is continued outward on the cranial nerves to their point of exit; but instead of being reflected upon the dura mater, as was formerly supposed, it forms a sheath for the nerve, and passes with it out of the cranium. A space is left between the dural and arachnoideal space, which may be injected from the subdural space, while the space between the arachnoideal sheath and the nerve may be injected from the subarachnoid space. These sheaths in the optic nerve remain distinct. The space between the dura and arachnoid was formerly called the *cavity of the arachnoid;* but since it has been demonstrated that the arachnoid is not reflected upon the inner surface of the dura, it is known as the subdural space. This space also contains a small quantity of serous fluid. It does not communicate with the subarachnoid space.†

The brains exhibited were injected in the following manner:

The spinal canal was opened in the dorsal region, the dura mater incised and a tube passed into the subarachnoid space. The solution of Berlin blue was then carefully injected. The unsupported arachnoid above the point of ligation formed a good pressure gauge. The fluid has passed into the subarachnoid spaces of the brain, into the ventricular cavities, as shown upon section, and also along the sheaths of the nerves to some extent. The arterial injections are made by opening the internal jugulars and tying a glass tube in each. The vertebral arteries are then ligated to prevent the descent of the injection through them. Next the common carotid of one side is tied, and a tube is secured in the other one. Warm water is injected till it runs pretty clean out of the tubes which are in the jugular veins. The injection mass is then used. To prevent loss of material through the external jugular and thyroid veins, a strong ligature is placed about the root of the neck and tightened as the face begins to take the color of the injection. When the mass begins to run out through the internal jugulars they are ligated and the operation discontinued. In order to avoid the injection of the face, the external carotids might be ligated, though this is hardly necessary, as no one would attempt the operation upon a cadaver which was afterward to be exposed to view. Besides, the face would probably be pretty thoroughly injected by way of the ophthalmic artery. The material used by me was the ordinary mass of gelatine colored with carmine.

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* C. Schmidt. Charakeristik der epidemischen Cholera. Mitau u. Leipzig, 1850. Quoted by Georg Althann. Beiträge zur Physiologie u. Pathologie der Circulation. 1 Der Kreislauf in der Schädelhöhle. Dorpat, 1871.

† Luschka. Axel Key and Retzius.

The phenomena of the intracranial circulation vary from those observed in other portions of the organism. This variation depends upon the fact that the circulation of the brain is carried on inside a case which is incompressible, and, therefore, is so far removed from the influence of the atmospheric pressure. For the slight amount of loose connective tissue that serves to fill in the foramina of the skull is inadequate, by its yielding, to compensate for the immobility of the cranial bones. The compensation is accomplished through the existence and intercommunication of the ventricular and subarachnoid spaces and the free mobility of the cerebro-spinal fluid. By the movements of this fluid the variations in pressure within the skull are transferred to the spinal canal, where the atmospheric pressure can exert its influence.

The separation of the arches of the vertebræ one from the other, the interval being closed by the elastic and movable ligamenta subflava, the large size of the intervertebral foramina with the loose connective tissue by which they are closed,* the space between the spinal dura mater and the walls of the bony canal, this space containing loose connective tissue and many large veins capable of rapidly emptying and filling; these are the conditions which render the spinal cavity capable of sustaining considerable variations in its contents.

It was taught by Munro and Abercrombie that the quantity of blood contained within the cranium was invariable. The cerebral mass, a semi-solid body, was incapable of contraction or expansion to any notable degree. On the other hand, the cranial cavity, after the closure of the fontanelles, was an air-tight case with unyielding, inelastic walls. As neither the contained body nor the containing case varied in size, therefore the quantity of blood which served to fill the space between these two must also be invariable. There might be an increased amount of blood in the arteries, but it would necessarily be accompanied by a diminished quantity in the veins and sinuses. The reverse was also true. There might be a local hyperæmia, but it would necessitate the occurrence of a compensatory anæmia elsewhere, as has since been shown to be true in regard to the intra-ocular circulation. This was thought to be a correct deduction, *a priori*, and it was supposed to be sustained by certain observations on the bodies of animals and men dead from hemorrhage.

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* Georg Althann, op. cit., p. 3.

Later and more careful observations, however, showed that in death from hemorrhage there is an actual diminution in the amount of blood in the brain, and that an increase may also be caused by suspending the body with the head downward, and in other ways, for instance, by hanging. To Magendie is due the credit of having by careful anatomical and physiological research demonstrated the actual presence and mobility of the cerebro-spinal fluid, and pointed out its relations to the varying vascularity of the brain. His results have been confirmed by Luschka, Hyrtl, Althann, Axel Key and Retzius as well as by M. Marc See and Quincke.*

The mechanism is as follows: With each cardiac systole there is an increase of the cerebral pressure. This is readily observed in the infant by simply placing the hand upon the fontanelle. This increased pressure is exerted upon the cerebro-spinal fluid, which descends into the spinal canal. During the cardiac diastole the fluid again fills the unoccupied space within the cranium. Again, with every expiratory phase of respiration, the intracranial pressure is increased, as at that time the venous blood ceases to pass downward into the thorax. This also causes a descent of fluid into the subarachnoid space of the cord. With the inspiration the rapid discharge of blood from the jugulars lessens the pressure, and the mass of fluid returns to the head. It has been suggested by Prof. Hyrtl that the displacement of the cerebro-spinal fluid is facilitated by the emptying and filling of the veins of the spinal canal. According to him these veins are full during inspiration when the cerebral veins and sinuses are emptied, and *vice versa*, the discharge of their blood into the lumbar and azygos veins is coincident with the increase of pressure inside the skull. His reason for this is that, in inspiration, the pressure of the abdominal viscera by the descent of the diaphragm impedes the flow of blood into the lumbar veins; while during expiration, the pressure upon the contents of the abdomen being removed, the venous current is uninterrupted.

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* The two latter quoted by Duret.—Etudes expérimentales et cliniques sur les traumatismes cérébraux. T. I. Paris, 1878.

The obstacles to the complete abstraction of blood from the head may account for the fact that in great emaciation and anæmia the wasting of the nerve centres is not proportionate to that which occurs in other portions of the body. The unyielding nature of the skull accounts for the increased amount of subarachnoid fluid present in old age, when the brain has undergone partial atrophy.

The part which inspiration plays in conditioning the return circulation of the brain will explain many of the cerebral phenomena which accompany diseases of the respiratory organs. In infancy, the frequent occurrence of somnolency and the other symptoms of so-called spurious hydrocephalus, are undoubtedly due to the fact that, owing to the presence of the fontanelle, a more complete anæmia of the brain is produced than in adults. The exposure of the brain of infants to the direct influence of atmospheric pressure, is an important factor in the production of many of the derangements of circulation which occur in early life. The relations of the anatomy and physiology of the cerebral circulation to its surgical pathology will be discussed in a future communication.

Society Reports.

STATED MEETING, JULY 19, 1880.

ELBOW-JOINT FRACTURES.

GEORGE R. FOWLER, M.D.

The interest awakened in the subject of fractures involving or approximating the elbow joint, and most especially the consideration of the circumstances leading to the production of deformities following such fractures, as presented in a lecture before this Society by my friend, Dr. Oscar H. Allis of Philadelphia, are very decided evidence of the importance of the subject. The recent paper by Dr. John A. Ray, the subject of this evening's discussion, dealing as it does chiefly with fractures in the neighborhood of, or involving the elbow-joint, resulting from railroad accidents, does not, in my opinion, represent the matter in the light most valuable to the general surgical practitioner. In view of the fact that upward of twenty cases of fracture in this region, the greater part of them due to falls either upon the hand or elbow, have come under my observation and treatment, I am impressed with the belief that a careful study of the clinical histories of such a series of cases would be of importance. I have therefore tabulated these cases, and will attempt to elucidate some points suggested by a review of the table.

The first point which I shall take up is the age of the pa-

TABULATED SYNOPSIS OF TWENTY CASES OF FRACTURE AT THE LOWER END OF THE HUMERUS.

BY GEORGE N. FOWLER, M. D., BROOKLYN, N. Y.

NO.	NAME.	AGE.	DATE OF ACCIDENT.	CHARACTER OF LESION.	CHARACTER OF ACCIDENT.	DRESSING.	PASSIVE MOTION BEGUN.	FREQUENCY OF PASSIVE MOTION.	PASSIVE MOTION DISCONTINUED.	RESULT AS REGARDS MOTION.	RESULT AS REGARDS DEFORMITY.	DISPLACEMENT OF CONDYLE.
1	W. B.	6	Nov. 7, 1872.	Fracture of external condyle.	Fall upon hand.	Plaster Paris and pillow; arm at right angle.	4th day.	Every 24 hours.	20th day.	Every motion perfect.	Angular projection of forearm lost.	External condyle ⅛ inch below internal.
2	J. S.	24	Nov. 12, 1872.	Fracture of external condyle with dislocation of radius and ulna backward.	Fall upon hand.	Softened sole-leather splints (lateral), sling; arm at right angle.	3d day.	Every 24 hours.	25th day.	Every motion perfect.	The angle of the forearm upon the arm absent.	External condyle ⅛ inch below line.
3	A. S.	40	May 5, 1872.	Fracture of external condyle; rupture of annular ligament and dislocation of radius.	Fall down cellar, striking on hand.	Starch dressing, soft pasteboard splint; arm at right angle.	3d day.	Every 24 hours.	28th day.	Pronation slightly impaired; otherwise every motion normal.	No appreciable deformity.	Not ascertained.
4	L. O.	9	May 13, 1873.	Separation of epiphysis.	Fall down stairs.	Plaster Paris; arm at right angle.	14th day.	Every 24 hours.	29th day.	Extension perfect. Flexion limited.	Outward angle of forearm destroyed.	Not ascertained.
5	J. D.	14	May 16, 1874.	Fracture internal condyle.	Fall with arm under body.	Arm rested upon pillow; water dressing.	10th day.	Daily.	25th day.	Every motion perfect.	Both arms alike.	Not ascertained.
6	F. H.	9	Jan. 14, 1875.	Fracture internal condyle.	Fall upon ice.	Sole-leather splints and sling; arm at right angle.	3d day.	Daily.	30th day.	Every motion perfect.	Outward angle as compared to other arm, destroyed.	Internal condyle ⅜ inch above line.
7	W. D.	4	Apr. 22, 1875.	Fracture internal condyle.	Fall down stairs.	Plaster Paris and pillow rest; arm at right angle.	14th day.	Daily.	27th day.	Every motion perfect.	Outward angle slightly altered.	Internal condyle ⅛ inch above line.
8	J. W.	3½	Mar. 14, 1876.	Fracture external condyle.	Fall from cradle.	Lateral sole-leather splint upon outside; arm at right angle.	5th day.	Daily.	28th day.	Extension perfect; in flexion places tips of fingers upon shoulder.	Outward angle destroyed.	External condyle below line.
9	D. P.	10	May 17, 1876.	Fracture coronoid process; dislocation humerus forward.	Fall from velocipede.	Two lateral sole-leather splints; arm at right angle.	2d day.	Daily.	18th day.	Every motion perfect.	No deformity.	None.
10	A. S.	4½	Jan. 10, 1877.	Fracture internal condyle.	Fall upon elbow while flexed.	Two lateral sole-leather splints; arm at right angle.	4th day.	Daily.	14th day.	Every motion perfect.	Arm, including forearm perfectly straight. Angular projection absent.	Internal condyle elevated ⅜ inch.

11	W.W.	10	Jan. 26, 1878.	Fracture external condyle; dislocation of radius.	Fall down embankment.	Two lateral sole-leather splints.	3d day.	Daily, under nitrous oxide for first week. Aft'rward ev'ry 2 or 3 days.	34th day.	Every motion perfect.	Angular relation of forearm to arm lost.	External condyle ½ inch below line.
12	M. A.	5½	Aug. 24, 1878.	Fracture internal condyle.	Fall from curb-stone.	Two lateral sole-leather splints; arm at right angle.	3d day.	Daily first week; afterw'd every 2 or 3 days.	31st day.	Every motion perfect.	Deformity very slight.	Not ascertained.
13	M. R.	45	Apr. 18, 1878.	Fracture internal condyle.	Fall from step-ladder.	Two lateral sole-leather splints; arm at right angle.	4th day.	Every 2 days.	20th day.	Every motion perfect.	Very slight lessening of angular projection as compared to other arm.	Internal condyle very slightly elevated.
14	C. C.	9	July 27, 1878.	Transverse fracture through trochlea, and longitudinal fracture between condyles.	Fall upon olecranon and posterior surface of ulna with arm at right angle.	Arm at right angle; two lateral sole-leather splints, sling.	5th day.	Daily first 10 days; afterw'd every 2 days.	27th day.	Perfect motion.	Angular projection of forearm decidedly lost.	Not ascertained.
15	G. T.	7	Apr. 28, 1879.	Fracture internal condyle.	Fall from wagon.	Arm at right angle; softened leather splints.	2d day.	Daily for 8 days; afterw'd every 2 days.	24th day.	Every motion perfect.	Angular projection of forearm lost.	Internal condyle elevated ½ inch.
16	J. C.	4	Dec. 7, 1878.	Fracture internal condyle.	Fall.	Arm at right angle; softened sole-leather splints, sling.	3d day.	Daily first week; occasionally subsequently.	22d day.	Every motion perfect.	Angular projection of forearm lessened.	Not ascertained.
17	H. G.	20	Dec. 8, 1879.	Fracture internal condyle.	Fall.	Arm at right angle; sole-leather splints, sling.	4th day.	Daily until end of 2d week; every 2 days subsequently.	29th day.	Every motion perfect.	Angular projection of forearm lessened.	Not ascertained.
18	H. M.	22	Nov. 28, 1879.	Transverse fracture through trochlea; left arm.	Machinery accident; patient carried around pulley shaft.	In the treatment of a fracture of the shaft of humerus, in middle third, the arm was securely fastened to body, with intervening gutta percha splints, including anterior and posterior surfaces of arm, being reflected under axilla and over chest (Richardson's). Deformity at elbow joint reduced and forearm placed in sling at right angle, and resting against anterior chest wall.	7th day.	Daily, by simply taking forearm from sling but not disturbing dressing on arm.	30th day.	Flexion perfect; extension slightly less than normal.	Angular projection of forearm lost.	None.
19	"	"	"	Fracture internal condyle; right arm.	"	Fracture of surgical neck of humerus in this arm required same splint as other arm. The forearm, however, was placed in an easy position and rested upon a pillow, and allowed to project forward at a right angle to anterior surface of body. Patient chose this position as it allowed him to turn the leaves of a book placed upon a small stand before him.	7th day.	Daily.	30th day.	Flexion and extension perfect.	No deformity.	None.
20	F. M.	14	Nov. 1, 1879.	Fracture internal condyle.	Fall with arm partly flexed.	Sole-leather lateral splints; arm nearly in full extension.	6th day.	Daily.	14th day. Patient ran away.	Flexion 112° Extension 135°	Deformity due to loss of motion.	Internal condyle elevated ½ inch.

tients. Most of my cases occurred in children, or during the age of recklessness. It is noteworthy that during this age so many fractures of one condyle alone should occur, separation of the epiphysis being the exception, contrary to what is usually taught and accepted.

Second : character of the accident. As before hinted, the majority of cases of this kind coming under the notice of the general surgical practitioner are the result of falls. Among the cases herewith presented, it will be observed that with the exception of two all were due to falls. When the exact position in which the patients fell could be ascertained, it was noticed that in a fall with the forearm extended, the patient striking upon his hand, a fracture of the external condyle ensued. The reasons for this are obvious: the lower extremity of the radius, adapted as it is for a wide range of usefulness in conjunction with the wrist and hand, offers a broader surface for the reception of the blow, and transmission of the force to the external condyle. A rupture of the annular ligament at the head of the radius, and consequent upward and outward dislocation of this bone, occurred in these cases.

Third : character of the lesion. Contrary to Dr. Ray's experience, the majority of my cases prove to be fractures of the internal condyle. I explain this by the fact that the internal condyle being very prominent is most likely to be injured by a fall occurring with the arm semi-flexed. A glance at the articular surface of the lower extremity of the humerus, will reveal the fact that the greater portion of this surface is situated to the outer side of a line drawn through the middle of, and parallel to, the shaft of the bone. This surface, when in articulation with the ulna, brings that bone more to the inner side of the humerus, and when the joint is caught, while fully extended, between two opposing forces, as, for instance, a railroad buffer accident occurring during an attempt at coupling cars, the prominent olecranon process of the ulna becomes the point of resistance upon the posterior surface of the arm, while the anterior surface of the lower extremity of the humerus is the point of resistance in front. The result that must almost inevitably follow will be seen at a glance. The sharp and prominent ridge marking the inner limit of the trochlea acts as a guard against the transmission of force through the ulna in that direction; consequently the wedge-shaped head of the latter bone is forced outward, breaking off and carrying with it the outer condyle. It may therefore be rationally expected that accidents of the kind described by Dr. Ray, and which I understand to have occurred mainly in the manner above indicated, will be more likely to result in fracture of the external, than of the internal condyle.

Fourth: dressing. It is now more than fifty years since that astute and far-seeing surgeon, Syme, announced that, in the main, fractures into and about the elbow-joint, after reduction, require no dressing beyond a simple roller bandage. This statement is as true to-day as it was fifty years ago, and I am convinced that the more elaborate the dressings applied in these cases, the worse will be the result. As will be seen by referring to my table, dressings of starch and softened pasteboard, softened sole-leather used as lateral supports, and the immovable apparatus of the French (plaster of Paris), were indifferently applied without regard to the location of the fracture, whether of the internal or external condyle, or that of the base of the humerus through the trochlea. In three instances no dressings whatever were applied with direct reference to the fracture at the elbow-joint. In one of these, No. 5, the case did not come under my care until several days had elapsed; the intra-articular inflammation was such as to demand cold-water dressings, and the traumatic fever ran so high that the patient was kept to his bed. It was found that the fractured parts were maintained in sufficiently accurate apposition by resting the arm upon a pillow. In the other two fractures, Cases 18 and 19, the occurrence of other injuries precluded any special dressing to the joint, and they were left in a great measure, so far as dressings were concerned, to take care of themselves. Yet in these instances no evil resulted to the joint, and the patients' interests certainly did not in the least suffer. By referring to these cases it will be seen that one of the arms escaped without any deformity whatever. I attribute this to the fact that the patient's arm was confined to the side in order to immobilize a fracture higher up in the humerus, while the forearm was allowed to rest on a pillow at a right angle to the upper arm and also at a right angle to the anterior surface of the body, the patient in the sitting position. This position was assumed by the patient in order that he might turn the leaves of a book placed on a low table beside him. Both arms being disabled rendered this position necessary in order that he might amuse himself during his long confinement in-doors. The other arm was subjected to the same treatment, so far as the upper arm was concerned, but the forearm not being used for any purpose, was hung in a sling at a right angle, and allowed to rest against the body instead of swinging clear of it, as in the case of the other forearm. In this arm there was some deformity, as will be noticed further on.

Fifth: passive motion. Probably the most interesting question, both to patient and surgeon in connection with this whole subject, is that of passive motion. How soon shall we commence, how often shall we practise, and when shall we discontinue, passive motion? In the light of my own experience, I am inclined to think that the only safe way to escape that which every painstaking and conscientious surgeon dreads next only to the loss of the limb itself, namely, anchylosis, is to move the limb as early as circumstances will allow; as often as is consistent with the amount of inflammation, both extra-articular and intra-articular, and not to abandon it until all motions normal to the joint can be performed without the occurrence of pain. Upon this point I am very positive, and I think that the experience of the majority of surgeons will bear me out in the above advice. The importance of early passive motion in cases of fractures and sprains in the neighborhood of the wrist joint has been urged recently by my friend, Dr. Pilcher, and every argument there made use of finds a ready adaptation to the subject of elbow-joint injuries. To put up a limb in a rigid dressing and maintain it for three or more weeks without attempting to move it, to have no concern as to whether or not the joint is becoming indissolubly welded together in one osseous or fibro-osseous mass, I believe to be a practice fraught with danger to the integrity of the patient's limb, to the surgeon's reputation, and last, but not least in these days of malpractice suits, to the surgeon's pocket.

That the danger of osseous anchylosis is very much overrated, I admit, and I believe for many reasons that it is not as likely to occur in the elbow joint as elsewhere; yet to my mind the dread of fibrous anchylosis is sufficiently great to impel me to make, as early as possible in the case, provision due and ample against such a state of affairs.

It is, in my opinion, the existence of the extra-articular inflammation, with its resultant deposit of organizable plastic material, which gives rise to the mischief where anchylosis results after fractures in this region. If it were possible to have an intracapsular arthritis, pure and simple, and limited as such, I believe that anchylosis of any kind would be a very rare sequel to such an occurrence. But it is a clinical fact that such an arthritis is an exceedingly exceptional occurrence, following injuries to joints of the character under consideration.

It is, then, to alterations in already existing ligamentous and fibrous structures about the joint, conjoined with the formation of new peri-articular fibrinous bands, that we must look for the chief cause of stiff joints as we occasionally meet them. In my experience, the points where these adventitious bands are most likely to occur, are upon the anterior surface of the joint, beneath and within the sheath of the Biceps tendon, and posteriorly about and within the sheath of the tendinous attachment of the Triceps muscle. I have frequently seen, under an anæsthetic, the hard and rigid outline of the tendon of the Biceps rise prominently into view, with its margins as sharply defined as if they had been laid bare by the dissecting scalpel, during the attempt to make full and complete extension of the forearm in the first or second week after a fracture of the elbow joint. Here full extension and flexion once daily, with a short period of massage, followed by twenty-four hours' rest, and at the end of that time a repetition of the same manœuvres, always resulted in a joint with fully restored powers of motion.

I have found it good practice to grasp the joint firmly with one hand, while making the needed movement of the forearm with the other. This serves the double purpose of steadying the parts against motion in any other direction than those of flexion and extension, and of giving immediate warning of the disposition to displacement of the fragments.

Sixth: result as regards motion. From what has been already said, it may be easily inferred that early, daily, and sufficiently protracted passive motion in suitable cases, will almost surely lead to a perfect restoration of the joint in all of its normal movements. Whether the end attained justifies the means employed, is a question between the surgeon and his conscience in each instance; but it seems to me that with anæsthesia, and especially the very safe and sufficiently prolonged anæsthesia of nitrous oxide, there can be no hesitancy as to which course we shall adopt. I would here remark that the only case in which there was any considerable loss of movement of the joint, was one which I saw in consultation, and advised its treatment in the nearly straight position. Had I been aware of the obstinacy of this boy's character, I should never have selected him as the subject for such an experiment.

Seventh: result as regards function. Dr. Allis has pointed out in an admirable manner, and demonstrated upon his own arm, the subject of an elbow-joint fracture in early life, that although the movements of flexion, extension, supination, and pronation may be present after fractures of the kind under discussion, an important function may be, and actually is, in the vast majority of cases, interfered with or entirely lost, and a deformity of the arm produced. The deformity and loss of function which Dr. Allis has particularly called attention to, consist in an absence of the normal angular projection which the forearm bears to the arm as the patient stands upright, with the upper extremities held in what is known as the anatomical position. This angle, although varying somewhat in different persons, is, presumably, present in most individuals, and is the means of the proper exercise of the carrying function, and of preventing whatever is carried in the hand, in the anatomical position above referred to, from interfering with locomotion. The loss of this angle, therefore, necessarily entails a loss of the carrying function and a deformity, and I am pained to record that in the majority of my cases this condition exists. How much the patients are damaged by the loss referred to, I am unable to state, inasmuch as not one of them was aware of the fact until I called attention to it, and none of them have yet hinted at a suit for damages, or even asked me to give them a sufficient sum to enable them to live comfortably the rest of their lives. However, the fact remains that there is positive deformity and loss of function as compared with the sound arm, and it behooves us, as seekers after sound scientific truth, to ask ourselves if this condition is the inevitable result of fractures into or about the elbow joint, and if it is not, then what measures shall we take to prevent it?

In surgical matters, as in other matters in life, the prevention of the accomplishment of a fact depends entirely upon our knowledge of the *modus operandi* of its occurrence, and the causes which lead to its development. The measure of our success, therefore, with our ounce of prevention, will be in direct proportion to the extent of our knowledge above referred to. Dr. Allis has spent a great deal of time and energy in throwing light upon the causes which lead to this deformity and loss of function, and those of us who heard his lecture in this amphitheatre, have, I am sure, profited by his remarks.

In looking over my table, I find that those cases having the least amount of deformity were those that were the least treated. I would desire to call especial attention to the fact that in the case in which no loss of this function, and consequently no deformity, occurred, the arm was not held in a sling. In reflecting upon this fact, it occurred to me that perhaps the sling had something to do with the production of this deformity. This idea was further strengthened by the fact, also observed by Dr. Allis, that in fracture of the external condyle, the condyle is dragged downward in the cases where this deformity is present, and in cases of fracture of the internal condyle, the condyle is forced upward. Assuming that the sling is the cause of the deformity, let us examine into the state of an arm held in a sling, with a movable fragment separated by a solution of continuity from the articular extremity of the humerus, but held loosely attached by ligamentous tissue. As the forearm rests against the front of the body, and is supported by the sling, the upper arm has a natural tendency by its own weight and the action of the external rotator muscles to fall to the side of the body and to rotate outward. As this occurs, the fragment in a fracture of the external condyle is held stationary by the external lateral ligament to which it is attached; the base of the humerus is drawn away from it by the rotation of this bone, and a lowering of the normal relative position of the condyle is the result. In the case of the internal condyle, exactly the opposite occurs; as the humerus is rotated outward, the fragment is forced upward, and the normal symmetry of the articular surface is destroyed. Either of these occurrences, a dragging downward of the external condyle, or a pushing upward of the internal condyle, will inevitably result in a loss of the angle of the forearm .with the arm, as well as that of the carrying function.

In view of these facts, I would suggest that cases of fracture, of the variety under consideration, be treated by a roller bandage, retaining the proper relation of the fragments; fastening the arm to the side of the body in a position of easy rotation outward, and allowing the forearm to project in what may be described as the beggar's position. If passive motion is rigidly and conscientiously enforced, it will matter but little whether the arm is semi-flexed or not, but it may be allowed to assume the position, in relation to the arm, most comfortable to the patient.

THE INDICATIONS FOR TREATMENT IN FRACTURES AT THE ELBOW.

LEWIS S. PILCHER, M.D.

The obliquity of the lower end of the humerus, and the greater descent and prominence of the inner side of the trochlea, give to the bones of the forearm a slight inclination outward from the humerus in every position of the elbow. By this means a greater mechanical advantage is given, particularly to the pronator radii teres muscle, whereby the power of its contraction is increased, and a barrier to the tendency of the strong pronator and flexor muscles of the hand to drag the radius and ulna toward the condyle, is effected. Preventing awkward collisions of the forearm with the body in the various movements of the upper extremity, this angle gives to them grace and freedom.

The "carrying function," alluded to by Dr. O. H. Allis (see page 300), depends upon this angle for its perfection. The preservation of this angle, after injuries involving the elbow joint, is, then, a matter of importance for other reasons than a desire to preserve the symmetry of the part. I am unaware of any other than mere general statements as to the character of this normal outward angle of the forearm with the arm. To obtain more exact knowledge with reference to it, I have made a series of measurements.

These measurements were made as follows: The forearm was fully extended and the arm rotated outward strongly, so that the palm of the hand looked to the front, and the internal tuberosity of the humerus above presented anteriorly. At the bend of the elbow, upon a line running through the condyles, the point overlying the middle of the trochlea, as indicated by the projecting coronoid process of the ulna, was marked. Six inches below this, another mark was made over the centre of the ulna, and a line drawn from this to the point already fixed above; a plumb line was then let fall from the internal tuberosity of the humerus, and the arm adjusted so that the line fell over the middle of the trochlea. The angle which this humeral plumb line and the ulnar line made to each other was then measured. Sixteen such measurements were made upon the right and left arms respectively of eight different children. It is recognized that abundant sources of error exist in measurements, the fixed points of which are so much overlaid by soft and movable structures as the ones in question; and although great care was used to avoid all errors, it is not pretended that the results are other than approximative. The following table exhibits the results:

LATERAL ANGLE OF FOREARM WITH ARM.

SEX.	AGE.	LEFT.	RIGHT.
Female . . .	12	11.5°	13.5°
Female . . .	9	6°	7°
Male	12	5.5°	11°
Male	11	3°	5°
Male	13	5°	9°
Male	12	4°	4.5°
Male	7	5°	9.5°
Male	10	0°	3°

The table shows how great are the variations in this angle, not only between different persons, but also between the two limbs of the same person. It will be seen that in none of the cases measured were the angles alike on both sides, the difference varying from a half degree to five and a half degrees; in all cases the angle was the greater on the right side. The least angle was zero; the greatest, thirteen and a half degrees. The number of measurements is not large enough to warrant the calculation of an average, but is large enough to show the total lack of value of any such calculation. They are sufficient to establish as a principle of surgical practice, that in attempts to adjust the proper angle of the forearm to the arm in the treatment of fractures involving the elbow joint, the sound limb affords little basis of comparison, but that every limb is a law unto itself.

To Dr. Allis is due the credit of having drawn attention to the special liability of fractures at the lower end of the humerus to such displacements of the fragments that this angle is not only destroyed, but that an opposite one is created. In addition to the displacement upward, which has been alluded to, a displacement forward is also often noticed, by which the shape and position of the olecranon fossa are altered, and exaggerated extension of the forearm permitted to such a degree that a distinct anterior projection may be produced in place of the bend of the elbow. This forward displacement of the condyloid fragment is due largely to the effect of contractions of the muscular masses arising from the condyles. In the causation of the angular distortion also, although Dr. Allis is inclined to give great prominence to the effect of certain splints and methods of bandaging as active therein, I am of the opinion that this displacement is due, in even greater degree, to muscular action, and notably to the triceps in cases treated in the flexed position.

The continuous relaxation, therefore, of those muscles which may cause displacement either directly, as the condyloid muscles, or indirectly, as the triceps, becomes a matter of importance in connection with attempts to secure union of the fragments in a normal position. The position of the forearm which will accomplish this to the greatest degree, I think to be one of pronation and of slight flexion, to an angle of from 140° to 135° with the arm. In this position sufficient flexion is accomplished to relieve tension of the flexor muscles, and yet not enough to excite the great triceps extensor to action, while the pronation relaxes the powerful pronator teres.

In my opinion the key to the largest degree of success in the treatment of all fractures involving or approximating the elbow joint, is to be found in placing and keeping the parts in that position in which the most complete relaxation and quietude of the surrounding muscles can be obtained. Fractures of the olecranon, of either condyle, supracondyloid fractures, or fractures *en T*, all alike demand the slightly flexed forearm—140° to 135°—with a varying degree of pronation or supination as the individual case may demand. The prime importance, as an indication for treatment, of the preservation of this outward angle of the forearm is apparent, an indication however that, as a rule, has been neglected in view of what has been considered as most important, the prevention of anchylosis.

The adoption of early passive movements in the treatment of fractures at the elbow,—including under this name for convenience' sake the different fractures named above,—for the purpose of preventing anchylosis, is insisted upon by the great majority of surgeons at the present time. The opinions of Doctors Allis and Ray, based as they are upon an unusually extensive experience, advocating the avoidance of passive movements and the maintenance of the joint immovable for from four to six weeks, demand attention and careful consideration. This point of practice was the subject of prolonged discussion in the Society of Surgery of Paris, at the meetings of April 7th and 14th of the present year, in the course of which M. Verneuil vigorously antagonized the practice of early mobilization in cases of fracture at the elbow, being thus consistent with the position which he assumed and elaborated in his memoir upon immobilization in the treatment of diseased articulations before the same Society, in June, 1879. The reasoning which the surgeon of La Pitié adopted in that memoir, was briefly that as immobility was an antiphlogistic means of the first order, and as inflammation was the chief cause of anchylosis in articular troubles, it would be illogical to attribute to immobilization the effects the causes of which it combats so efficiently. There are two kinds of articular immobility between which there is a capital distinction. One is produced by peri-articular muscular contraction, an *active* immobility, which favors and even excites articular diseases; the other is *passive*, is secured by the apparatus of the surgeon and is powerful against the disorders which the first provokes. As the result of a very exaggerated fear of anchylosis, practitioners have been caused to commit two grave faults,—too early suspension of passive immobilization, and the premature reëstablishment of articular movements. In this discussion in Paris, as well as in the present discussion, ample clinical facts have been adduced in support of the most diverse methods, so that simply having recourse to clinical records is confusing to one desiring to find the best rational method of treating fractures at the elbow. Are there not general principles underlying this subject, by the application of which to individual cases, a rational treatment may be devised—treatment varying greatly perhaps in different regions and conditions on account of the modifications which the special region may demand?

One of the most important lessons which antiseptic surgery has taught us, is the fact that even large joints may be opened with impunity, provided certain precautions are used; that extensive wounds of articular cavities may be made and repaired without any inflammatory reaction intervening. Wounds of joint cavities, if subcutaneous or antiseptically treated, exemplify the general law that subcutaneous injuries seldom inflame. But that this law should be true of any injury demands these two things: 1. That it be protected from further injury. 2. That it be placed in a proper condition for recovery from the injury already sustained.

In fractures involving the elbow joint, as in wounds of any joint, these are the ends of treatment to be accomplished if inflammation is to be avoided and anchylosis prevented.

First, then, how may protection from further injury be best accomplished? The chief source of further injury is the movement of the fragments upon each other. The results of such movements are the intensification of the temporary hyperæmia incident to the original injury, and its conversion into an inflammatory congestion, the effusion of inflammatory exudates into the joint cavity and among the peri-articular muscles, and the formation of an excessive callus. The organization of the inflammatory exudates, and of the excessive callus may both become sources of permanent anchylosis of the joint. Immobilization of the fragments, therefore, is the indication of first importance to be met. The bony eminences at the elbow give origin to numerous muscles, so that the joint is preëminent for its wealth of muscular armature. The condyles particularly are fixed points from which power is exerted upon distant parts. To secure immobility of a condyloid fragment, quiet of the muscles springing from it must be maintained. Any movement at the joint, passive so called, or active, will provoke contraction of some of the peri-articular muscles, and some disturbance of the fragments. Even aside from muscular agencies, it is impossible to support the fragments so firmly that the joint may be moved without disturbing them. To obtain, then, immobilization of the fragments, absolute immobilization both of the articulation and of the peri-articular muscles is necessary, and this must be continued until such time as firm union of the fragments has taken place, a period of three or four weeks certainly.

This complete disuse and absolute immobilization contemplated, has evils of its own. It favors languor of the circulation, hinders absorption, and contributes to degenerative changes by suspending function. The first of these, however, is counteracted by the effect in promoting absorption, which the equal and constant pressure of a well applied immovable apparatus may be made to exert; while the last is quickly overcome after motion is restored.

In all cases a certain degree of immediate stiffness and restriction of motion must be expected upon the removal of the apparatus, due chiefly to stiffness and slight adhesions among the peri-articular muscles. This, as a rule, will quickly disappear under massage and physiological use, without the intervention of forced movements.

It will be seen that all the special conditions presented by the elbow joint, as developed in the review of them which has been made, unite in emphasizing the importance of securing absolute passive immobility of the peri-articular muscles until permanent fixation of the fragments has been accomplished. By this means may be avoided displacements of the fragments with their unfortunate results; by this means is to be found early union of the fragments, with a minimum amount of callus; by this means are to be prevented in the highest degree inflammatory complications and the resulting dangers of anchylosis. I find myself, therefore, logically led to agree with the position taken by M. Verneuil and by Drs. Allis and Ray, in their recommendations to treat fractures of the elbow by the prolonged application of an immovable apparatus, and in their objections to the use of early passive motion.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

IX.—HIERONYMUS FABRICIUS AB ACQUAPENDENTE.

1537—1619.

IN the little town of Acquapendente, anciently called Aucula, or Aqua Taurinæ, twelve miles from Orvieto. in central Italy, in the year 1537 Geronimo Fabrizio was born of poor but respectable parents. In after years the name of his native town was appended to his Latinized name, and henceforth used to distinguish the great Italian anatomist and surgeon from the celebrated German surgeon—Fabricius Hildanus—who was born at Hilden, near Cologne, in 1560, and died in 1637.

Jerome was a boy of great promise and eager for an education. He was accordingly sent to Padua, where he distinguished himself by his proficiency in the acquisition of the Greek and Latin languages as well as in the study of philosophy. Having completed the university course, he at once, by natural selection, engaged in the study of the medical sciences under the immediate mastership of that most illustrious professor—Gabriel Fallopius—the great luminary of that brilliant scientific era. Jerome graduated with honor, having exhibited extraordinary ability at his examination for the degree. Under such a master, he, of course, took to anatomy and surgery as naturally as a duckling takes to the water, and he soon swam and dove into the depths of these sciences with the same facility and grace that the aquatic bird does in its favorite element. For a number of years he was the demonstrator of anatomy in the University of Padua, under his great master, during which time he gave such evidence of skill and aptitude to teach, that it was manifest that he would one day become the successor of Fallopius, and add splendor to the already glorious medical school of Padua. And thus it came to pass. When Fabricius reached the age of five and twenty years Fallopius died (1562), and his favorite pupil was at once elected by the Senate of Venice his successor in the chair of anatomy, to which was subsequently added that of surgery. He filled the double professorship with increasing reputation and renown for almost half a century (1562–1609).

Fabricius possessed every requisite to insure and maintain success; he was kind and generous, learned and eloquent, sound in judgment and skillful in practice, earnest and animated by a glowing enthusiasm. His fame extended over the continent of Europe, from every portion of which students flocked into Padua to listen to his prelections and witness his demonstrations. He was not, however, without some of the little indiscretions incident to most men. On one occasion, it is said, while engaged in explaining to his class the mechanism and mode of action of the vocal apparatus, he, unfortunately, ridiculed the peculiar pronunciation of the Germans, which so offended them, that all the students of that nationality deserted the college in one day.

The Republic of Venice recognized the talents and importance of Fabricius. The Senate built him a new, very spacious, and magnificent anatomical amphitheatre, and had his name inscribed on the front of it. It also decreed him an annual stipend of one thousand crowns, and created him a Knight of St. Mark. In addition to all this the Senate voted him a massive golden chain as a badge of its respect, and when infirmity and old age came upon him, and rendered him incapable of continuing his labors, his salary was paid him, ungrudgingly, to the day of his death, and after this sad event occurred (May 21, 1619), it honored his name and memory by a noble statue.

Far grander and more enduring is the monument which Fabricius erected for himself by his genius and researches. His two greatest honors are the discovery of the valves in the whole system of veins, and the having been the preceptor of the immortal Harvey, to whom he furnished the key wherewith he unlocked the mysteries of the circulation of the blood.

The celebrity of the medical department of the University of Padua lay nearest to the heart of Fabricius, and to its promotion he devoted his greatest energies. Fame and not gain was his aim. Aside from his salary he was utterly indifferent to pecuniary gain. He refused fees for his services as physician and surgeon, and placed in a cabinet, set apart for the purpose, such presents as his generous and grateful patients insisted on his taking; over this cabinet was inscribed this sentiment—*Lucri neglecti lucrum.*

Anatomy, physiology, and surgery were all enriched by his researches. His works were quite numerous, as will be seen by the appended bibliography. They comprise not less than sixteen treatises. His *Opera omnia anatomica et physiologica* is a grand folio of nearly five hundred pages, illustrated by hundreds of figures, engraved on sixty-one full page plates. Thirty-three are devoted to his treatise on the formation of the fœtus, human and comparative; many are used to exhibit the valves in the veins. They are all exquisitely beautiful, marvelously accurate, and strikingly graphic. He was an ardent investigator of living phenomena: not content with the dissection of dead structure, he desired to understand the vital functions, with a view to which he made numerous vivisections. It is indeed fortunate for science that the world was not then pestered with the morbid sentimentality it now encounters in some of our large cities and small Berghs; had it been so, the circulation of the blood would still have remained a mystery. His study of the formation of the chick *in ovo* is a model of patient and well-directed research. The essay on the language of brutes is not only curious, but worthy the attention of physiologists of the present time. He also studied the comparative anatomy of the cæcal appendix; demonstrated the muscular coat of the bladder; the structure of the œsophagus, stomach, and bowels, as well as many delicate points relative to the anatomy of the eye, the ear, and the larynx.

Fabricius has been styled the father of modern surgery. He certainly made many improvements in both the science and the art. His works in surgery have been so highly esteemed, and so eagerly demanded, that no less than eighteen editions of them have been published in various languages and in different countries. They are illustrated with many plates of ingenious instruments and complex apparatus, which will vie with the Sayerized engines of this mechanical era in surgery. Space will not admit of any further notice of this great master's work. I must confine the remainder of my remarks to the history of the discovery of the valves in the veins.

That Fabricius discovered in 1574 the valves in the entire system of veins of the body is most true, yet it is not true that he was the first and only anatomist that ever observed a valve in a vein and recorded the fact in an anatomical treatise. Marx refers their discovery, but on insufficient grounds, back to the time of Erasistratus. (*Diatribe anatomico-physiologicum de structura atque vita venarum*, 8vo, Carls., 1819, p. 6.) Nor is it evident that Dionysius, Alberti, or Theodorus, to whom Haller refers, ever saw the venous valves. To Charles Étienne or Carolus Stephanus, belongs the honor of having first observed them, which he did in the hepatic vein, and called them *apophyses membranarum*, saying they are to prevent the regurgitation of the blood, in which function he compared them to the valves of the heart. I have examined this reference in my esteemed copy of his rare work (*De dissectione partium corporis humani*, etc., folio, Paris, 1545, pp. 182, 183), which confirms me in the opinion of Cruveilhier that Stephanus of Paris was the first to make the discovery, and, I will add, the first to comprehend their function as true valves, viz.: to prevent regurgitation of blood. In 1551 Amatus Lusitanus published a letter from Cannanus, in which it is stated that in 1547 he discovered the valves in the vena azygos. In 1563 Eustachius published an account of the valves of the coronary veins. Piccolhominus published his work on anatomy (*Anatomicæ prælectiones*, etc., folio, Rome, 1586), which contained a very lucid account of the valves of the veins, seventeen years previous to the publication by Fabricius of his monograph on the venous valves (*De venarum ostiolis*, fol., Padua, 1603). The former, therefore, antedated the latter by a long period in publication, notwithstanding it was, even then, twelve years subsequent to the alleged discovery of Fabricius.

Harvey gives the entire credit to his old master in the following words. "The celebrated Hieronymus Fabricius of Acquapendente, a most skillful anatomist, and venerable old man, or, as the learned Riolan will have it, Jacobus Sylvius, first gave representations of the valves in the veins." (*The Works of Harvey*, *Syd. Soc.*, c. xiii, p. 62.)

It is quite certain that Sylvius saw the valves in question, and called them *epiphyses venarum*. It has been suggested, however, that he may have heard of them from Cannanus, who demonstrated them to Lusitanus in 1547; the work of Sylvius was not published until 1555. Meryon (*Hist. of Med.*, p. 289) sums up the case thus: "Now as Étienne saw only the valves of the vena azygos and hepatic vein, Cannanus and Amatus those of the vena azygos, and, perhaps, also those of the renal and iliac veins, whilst Sylvius described those in the veins of the extremities and neck, we may charitably conclude that all were engaged in their own independent investigations, and that all may participate in the merit of the general discovery. But when it becomes a question of absolute priority, it certainly does appear that the honor should be conceded to Étienne."

Fabricius himself lays claim to the discovery of the valves and called them *ostiola*. "Who, indeed," he goes on to say, "would have thought of finding membranes and ostiola within the cavities of the veins of all places else, when their office of carrying blood to the several parts of the body is taken into account? The ostiola nevertheless were necessary, and we may therefore safely say that they were contrived by the Almighty Maker of all things, to prevent over-distention of the veins. * * What first astonishes," says he, " is that these valves have so long escaped anatomists, ancient as well as modern, and so entirely escaped them that no mention was made of them, no one had seen them, until the year 1574, when I observed them for the first time with great joy (*summâ cum lætitiâ*)."

The valves in the veins are the anatomical proof of the circular motion of the blood, yet, stranger than all else to us at this time is the fact that Fabricius failed to see it, being blinded by the old theories of the flux and reflux of the blood.

The following is a complete list of his works, and of the several editions.

Pentateuchus chirurgicus, Francfort 1592, 8°; 1604, 8°. *De visione, voce et auditu*, Venice 1600, fol.; Padua 1603, fol.; Francfort 1605, fol.; 1614, fol. *De formato fœtu*, Padua 1600, fol.; 1603, fol.; Venice 1620, fol. *Tractatus de oculo, visus organo*, Padua 1601, fol.; Francfort 1605, fol.; 1613, fol. *De venarum ostiolis liber*, Padua 1603, 1605, 1625, fol. *De brutorum loquela*, Padua 1603, fol. *De locatione et ejus instrumentis*, Padua 1603, 4°; Venice 1603, 4°. *De musculi artificio et ossium articulationibus*, Venice 1614, 4°. *De respiratione et ejus instrumentis libri duo*, Padua 1615, 4°. *Opera chirurgica in duas partes divisa*, etc., Padua 1617, 1647, 1666, fol.; 1671, 1684, 1711 (in Italian); Venice 1619, fol.; Francfort 1620, fol.; Leyden 1722, fol.; Lyons 1628, 4°; (in Dutch) 1647, 1666, fol.; (in French) 1649, 1670, 1729, 8°; Rouen 1658, 8°; (in German) Nuremberg 1672, 4°; 1716, fol. *De motu locali animalium secundum totum*, Padua 1618, 4°. *De gulâ, ventriculo, intestinis, tractatus*, Padua 1618, 4°. *De totius animalis integumentis opusculum*, Padua 1618, 4°; Milan 1672, 4°. *De gressu*, Padua 1618, 4°. *De formatione ovi et pulli*, Padua 1621, fol. *Opera anatomica*, Padua 1625, fol.; Francfort 1623, fol. *Medicina practica*, Paris 1634, 4°. *Opera omnia anatomica et physiologica*, Leipsic, 1687, fol.; Leyden 1723, 1737, fol.

EDITORIAL DEPARTMENT.

THE ASS-HEADED GOD.

The gentle reader of the ANNALS, on his next visit to the metropolis, will assuredly wend his footsteps to New York's own and only obelisk, and, as he cons the inscription on that aged monolith, his eye will possibly be arrested by one signally grotesque hieroglyph thereon. Being a learned physician,—and *ipso facto* an Egyptologist,—he will recognize (with whatsoever it may be of filial emotions) the emblem of "the ass-headed god." This divinity was an important personage in that ancient hierarchy where the practice of the healing art went hand in hand with the exercise of the sacerdotal function. But if the erection of the obelisk in New York is destined to revive the waning influence of the ass-headed god in this Western world, we shall devoutly regret that the needle had not sunk quietly to rest among the algæ of Sargasso. For there can be no doubt that the unconscious worship of this terrible "*s-hr*," which has been transmitted to us through decades of centuries, should be held accountable for many of the infirmities which retard our progress in medicine to-day.

These infirmities may be summed up in a single phrase: the dissipation of force. The best constructed steam-engine converts into effective work but a small percentage of the fuel consumed. And the best trained man is often disheartened by the waste of energy which the conditions of life impose upon him. How scanty, then, must be the net performance of the medical brotherhood, with its loose construction and its indifferent training! For all avoidable waste the ass-headed god is responsible.

The latent insincerity of well-meaning individuals entails an enormous waste. No man has greater need of truthfulness than the doctor. And probably no man has greater difficulty in reaching even approximate truthfulness. When the patient demands the exact truth, and when the doctor knows that an exact statement of the exact truth will produce a dangerously false impression upon the mind of the sick man ;—in short, when it is seen that truth-speaking will be equivalent to a pernicious falsehood, who is to decide what measure and manner of lying may be equivalent to a wholesome truthfulness ? If problems of this nature were mere casuistic charades, they could be passed lightly over. But their import is, in fact, very serious. They mould the character and shape the entire career of the medical practitioner. They present to the young physician a dilemma, both horns of which threaten disaster, the one to his manhood, the other to his business prosperity. The ass-headed god would bid him choose between *mensonges de convenance* and starvation ; while a more enlightened cultus would show him that, in the long run, character is the most potent factor in human life, and a decorous reserve the best protective against questions which had better not be asked or answered. Certainly, to lose character is to dissipate force.

The subtle reaction of the *mensonge de convenance*, to which the ass-headed god would drive us all, is baleful in a thousand ways. It weakens the individual. It lowers our common profession. We trust and distrust ; we respect and yet we suspect one another. Dr. A. heard Dr. B. lie to Mrs. C. for her good. Now when can Dr. A. feel sure that Dr. B. is *not* lying for somebody's good ? In the same way, Dr. B. doubts Dr. A. ; and, however great their mutual liking, their molecularity toward each other is such that—to borrow a chemist's phrase—the slightest spark will cause an explosion between them. Now, when men of character know each other, it requires more than the gossip of an idle woman, or the mischief-workings of a parasite to effect a breach in their relations. And when we see men in all ranks of the profession, in the town and in the country, putting forth their choicest energies in struggles each against the other, the reflection is forced upon us that these men, however great their talents, are lacking in character ; and hence they cannot do otherwise than dissipate their force. But the worship of the ass-headed god is incompatible with the attainment of character, and *hinc illæ lachrymæ* over the arrival of the obelisk.

But we shall hope for the best. When great Pan was dead, no resurrection followed. The ass-headed god has dropped his sceptre, and we cannot believe that he will pick it up. The swinging clubs which make his picture terrible will soon be harmless. Perhaps the scientific spirit has entered into his lithic being, and prompted him to brush up his aphorisms on occidental soil. In that case, who can tell him where to commence his studies? Will plaster-jackets interest this practitioner in eons of sand? Shall we attempt to teach him something about crural asymmetry? Perhaps he saw the beginnings of natural selection, and will tell us how generations of pyramid-builders came to have one leg shorter than the other. Or will some one have the hardihood to ply him with our batteries, and sphygmographs, and thermometers, and dynamometers, and all the other paraphernalia of precision which are indispensable to the practice of medicine in 1880? After all he may turn out to be more catholic in his aptitudes than the late surgeon-general of the Russian navy. We were present in a Bellevue ward when that gentleman pronounced one of Wood's operations *magnifique*, but haughtily refused even to look at a binaural stethoscope, declaring that a surgeon in the Russian navy could, under no circumstances, have use for a *pelvimètre!*

THE CLINIC.

1. **Epithelioma of Cervix Uteri. Wackerhagen.** Mrs. M., 48 years. Multipara. Menses normal till two years since, when menorrhagia occurred, with severe pain in lumbar region. General neuralgia of extremities, which has ceased since operation. July 9th, cervix found to be seat of malignant growth. July 13th, cervix amputated by galvano-caustic wire, with Dawson's battery. Patient has rapidly and steadily improved in general health and appearance. No rise in temperature, nor pain except on change of dressings.

2. **Fracture of Pelvis. Wight.** Long Island College Hospital. Death. H. P., 33. Admitted April 20, 1880. Had been crushed between a sugar hogshead and a pump. Could not stand, nor turn in bed; great pain in pelvic and lumbar regions. Complete retention of urine, relieved by catheter. Diagnosis: fracture of pelvis, and rupture of urethra. Question of perineal section raised, but delayed on account of patient's condition. Death on April 25th. Autopsy showed fracture of right rami of pelvis, upper one depressed. Left rami also fractured, lower one impacted. Membranous urethra completely torn across. Fatty *emboli in lungs, sub-peritoneal* extravasation and peritonitis.

3. **Cervical Tumor. Dodge.** Extirpation. Recovery. Female, 47. Multipara. Small tumor beneath right ear, between ramus of jaw and sterno-mastoid muscle, movable and painless, 2.5 c. in breadth. Has been growing for two years. Patient has lost brother from cerebral tumor (character unknown). Operation May 7, 1880. Straight incision over growth. Growth bound down by thickened fascia, which being reflected, tumor was suddenly released, and easily removed from bed of glistening membrane. Tumor resembled pancreas, of rosy flesh-tint and very friable. Wound stuffed with carbolized sponge. Healing by granulation.

4. **Mammary Cyst. Dodge.** Removal. Recovery. Female 46. Multipara. Tumor of right breast, unretracted nipple in the centre of growth, movable, skin slightly adherent, fluctuation, measures 10 c. x 10 c. x 5 c. Adjacent glands not enlarged. Has been recognized since infancy, painless, and about size of hazel nut till within 6 months, when it rapidly grew and became painful. Operation June 9, 1880. Tumor removed by elliptical incision. One small gland removed from its axillary angle. Hemorrhage rather free, rendering several ligatures and pressure necessary. Union occurred by first intention. Tumor contained about 64 c. c. of grayish, glutinous fluid, and interior was lined by yellowish fringe-like masses. A second tumor found on axillary side of sac, measuring about 4 c. in diameter, with spongy interior, containing material similar to main growth.

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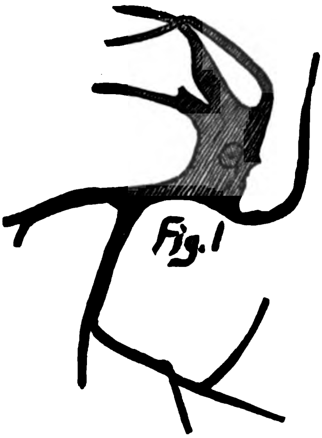

Fig. 1

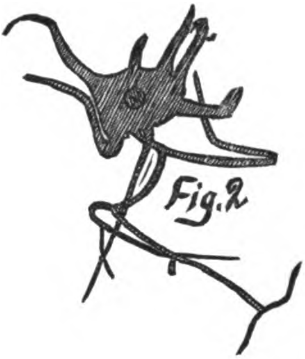

Fig. 2

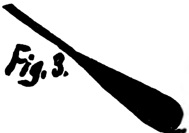

Fig. 3.

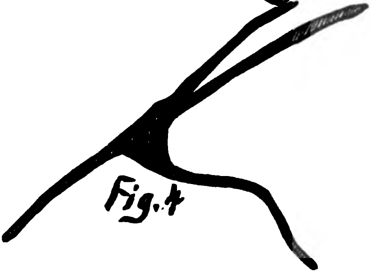

Fig. 4

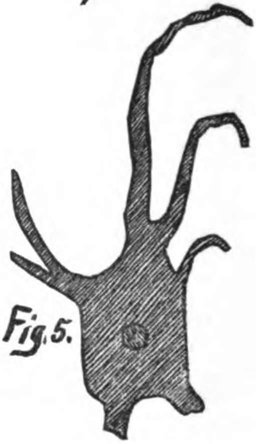

Fig. 5.

PLATE I.

VOL. II, No. 10. OCTOBER, 1880.

ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

THE PHYSIOLOGICAL ANATOMY OF THE SPINAL CORD AND THE MOTOR TRACT OF THE CEREBRUM.

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MUCH as our knowledge of the processes of the nervous system has improved of late years with the finer and more accurate instruments of modern research, it has yet seemed to me that one or two very simple and yet unimpeachable generalizations have been entirely overlooked; and as these generalizations inclose facts of which a thorough appreciation is a necessity to a proper study of nervous physiology and pathology, I have thought fit to preface my paper with a few remarks concerning them.

The cell of the nervous tissue, like that of all other tissues, is the essential, living part. In it go on the mysterious molecular changes which are presented to us as nervous action. To it the surrounding structures are entirely subservient. It is the textural Rome to which all roads turn. It is upheld by the connective tissue, it is nourished by the capillaries and lymphatics, it is drained by the venules.

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* Delivered before the Society, April 5th, 1880.

Although it differs from other cells in many ways that are strongly marked, in none is it more distinctive than in the fact that it is placed in direct or almost direct communication with distant structures by fibres that conduct sensations *to* it and by others that convey actions *from* it. The type of a nervous organism, then, is a cell, to which are attached conducting fibres for sensation and motion respectively. The cells being clustered together in what is known as gray matter, and the conducting fibres being composed of so-called white matter, all nervous structures are made up of gray or cellular and white or conducting matter, be the relative proportions of each and the form of the particular organ what they may. Each group of cells—perhaps the science of the future will enable us to say each cell—has an intelligence of its own, which has long been beclouded by the name of "function." This intelligence, misnamed function, is adequate to the purpose of that particular group of cells. If they be the cells of a jelly-fish, they enable the animal to float on the surface of the water, to nourish itself, and to seize its prey. If they be the cells of a bee, they enable it to organize all the wondrous economy of the hive—to select its queen, to eliminate the drones, to build the mathematical cell. If they be the cells of the lion, they form the anatomical substratum of all the beast's kingly and ferocious habits. Finally, when they become the cells of the human gray matter, they are intelligent still, varying in the degree of that intelligence as it mounts from the lowly lower end of the spinal cord, increasing in complexity as it ascends, until it culminates in the most wonderful gray matter of all species—the cortex of the cerebrum, the seat of the mind.

From the foregoing statements it follows that all nervous organisms are composed of numerous foci of cellular intelligence, intercommunicating and bound together into one harmonious whole by the white or conducting fibres. We must therefore study all collections of gray matter in two different aspects—viz., in their independence, and in their relation to other collections of gray matter.

The spinal cord is nothing more than two upright columns of gray matter, ensheathed in an envelope of white or conducting matter. When it is cut across transversely, the disposition of the gray matter in the shape of horns, anterior and posterior, becomes evident. The anterior horns, or cornua, are studded with large characteristic cells, which are unipolar or multipolar. Certain of these cells are possessed of a peculiar process, which differs from its companions in not branching, and in increasing in size as it passes away from the body of the cell. This is known as the "axis cylinder process," and it is claimed that it becomes clothed with myeline and is directly continuous with the axis cylinder of a motor nerve. We owe the discovery of this process in the human being to Deiters* —who asserted that it was also to be found appended to all central nerve cells—although, in 1874, R. Wagner† had observed a similar prolongation, sometimes two, in the central nervous organs of the torpedo, and Remak‡ had, in 1854, described the same peculiarity of structure in the anterior horn cells of the spinal cord in the ox. Deiters has been confirmed by a number of observers, among others by Max Schultze, Jolly, Gerlach, Arnold, Kölliker, Arndt, Koschennikoff ‖. These cells are distributed in groups, which are differently situated in different regions. Not only are these bodies directly connected, then, with the motor nerves, if we may believe the testimony of this array of careful observers, but they also exercise a paramount influence over their nutrition, and that of the structures to which they are distributed. Thus, if a group of these cells be destroyed by disease, the nerves to which they give origin undergo degeneration, as well as the muscles in which these nerves terminate; or if the continuity of a motor nerve be interrupted, as by an incision, the peripheral filament and its attached tissues pass through the same molecular changes. Whether the cell, whose integrity is necessary to the motor properties of the nerve, is the same cell which regulates its nutrition—whether, in other words, the motor cell is also a trophic one—or whether there be both motor and trophic cells, is one of the mooted questions of the day, the weight of evidence tending to prove the latter assumption. The posterior horns have been by no means as well explored as their motor analogues. They are separately strewn with nerve cells which are devoid of striking characteristics. From the direction of the fibres in the white columns immediately adjoining the posterior cornua, which, as we shall learn later, we have reason to believe are continuations of the sensory root fibres, it seems fair to infer that these cells are in communication with the sensory nerve fibres, but possess no power over the nutrition akin to that of the cells in the anterior horns. Upon the posterior root, which, as you do not need to be told, contains the sensory fibres going to the periphery, sits a collection of gray matter, or, technically, a "ganglion." This ganglion is the centre whence emanate the impalpable influences regulating the nutrition of the sensory nerve fibre; and any sensory fibre degenerates when separated from it, even though this fibre remain attached to the posterior horn. Thus, if a section be made between the ganglion and the posterior horn, as at *a*, Fig. 6,

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* Untersuchungen über Gehirn u. Rückenmark, herausg. von Max Schultze, Braunschweig, 1868.

† Handwörterbuch, Bd. III., Abth. I., § 377.

‡ Deutsche Klinick, 1854, Nro. 27.

‖ See Henle, Nervenlehre, 1879, § 29.

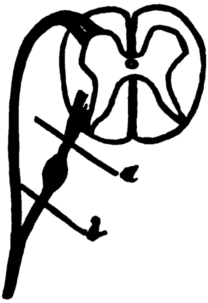

FIG. 6.

the portion in connection with the ganglion remains unaltered, whilst that towards the cord degenerates; or if the cut be between the ganglion and the periphery, as at *b*, the peripheral filament dies, whilst the central portion manifests no change. There would seem to be some ground for a belief that section of a sensory nerve causes degenerative changes in what are more purely sensory tissues, whilst section of a motor nerve brings about corresponding changes in motor tissues. Thus, injury to the latter class results in trophic alterations in bones and muscles, whereas injury to the former results in nutritive disturbances in the skin.*

By means of these cells and the material highways formed by their connected nerves, the spinal cord innervates, or, in technical phrase, "presides over," the structures of the trunk and the extremities. In other words, these various structures and their innate properties are brought in subjection to the intelligence of the cells of the spinal cord; and the contractility of these tissues, their sensibility, and nutritive changes, are largely influenced by these cells. But this sensation and motion, of which we have been speaking, are largely under the control of the will, through the medium of nervous strands, which we shall describe presently, and are, therefore, *voluntary*. There are, however, other sensations and motions which are beyond the influence of the will, or only partially subservient to it, which yet have their dominating cells within the gray columns of the spinal cord, although the precise location of these particular bodies has not yet been determined. These involuntary or semi-involuntary nervous actions are of several varieties, among which the foremost in interest are the Vaso-Motor. These merit a special description.

The two gangliated cords of the sympathetic nervous system lie on the anterior surface of the spinal column, one on either side of the bodies of the vertebræ. The masses of gray matter contained in their ganglia are connected by the so-called communicating branches with the anterior divisions of the spinal nerves, mainly with the anterior roots of these divisions. Irritation of one of these communicating branches causes contraction of the capillaries in the region to which is distributed the corresponding spinal nerve; and division of this same communicating filament produces a dilatation of the same vascular area. It has been ascertained that there are in these communicating branches two classes of nerve-fibres, the one which contains the greater number of filaments running from the spinal cord outward, the other proceeding from the ganglia upon the gangliated cords of the sympathetic towards the periphery. We owe the recognition of these anatomical details to Courvoisier,* Schiff,† Vulpian,‡ and Gianuzzi,§ whose method of research was, by means of an ingenious application of the well-known law of Waller that a nerve undergoes structural degeneration when severed from the mass of gray matter from which it has taken its origin. Thus, when a section was made of one of these communicating branches, and it was found after the expiration of several days that but few of the fibres had undergone degeneration in the filament still attached to the cord, whilst the bulk of those in the filament attached to the sympathetic ganglia exhibited textural alterations, the conclusion was certain and easy that the greater number of these fibres had their origin in the spinal cord and the lesser number started from the sympathetic ganglia. The vaso-motor nerves for the trunk, extremities, and abdominal viscera originate in the following manner:[*]

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* Vide Charcot, Leçons sur les Maladies du Système Nerveux, t. I., 1876, prem. leçon.

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* L. G. Courvoisier, Beob. über d. sympath. Grenzstrang, Arch. f. microk. Anat. herausg. v. M. Schultze, 1866, S. 13–43.

† Vierordt's Archiv, XI.

‡ Leçons sur la physiol. générale et comparée du système nerveux, 1866, p. 725.

§ Ricerche eseguite nel gabinetto di Fisiologia della R. universita di Siena, 1871, 1872; Siena-Roma, 1872, p. 51.

Those for the upper extremities are derived—

1. From the inferior cervical and superior thoracic ganglion, uniting at the brachial plexus, close to the first rib;
2. From the nerve-roots of the brachial plexus;
3. From the thoracic cord of the sympathetic, and from the nerve-roots of the 3d, 4th, 5th, 6th, and 7th dorsal nerves, principally from the 3d and 7th;

Those for the lower extremities, proceed—

1. From the spinal cord with the sciatic and crural nerves;
2. From the abdominal cord of the sympathetic.

The abdominal viscera are supplied with fibres arising from a considerable length of the dorsal and lumbar cord and running within the sheath of the splanchnic nerve, as well as by fibres from the abdominal cord of the sympathetic.

The vaso-motor nerves of the head and face take their origin from what is known as the "cilio-spinal centre," which extends from the 6th cervical to the 4th dorsal vertebra;[†] and when this centre is destroyed, there ensues a marked dilatation of the capillaries of the head and face.

It is undecided as to whether the vaso-motor fibres are all constrictors, or whether there are both constricting and dilating filaments. As the coats of the capillaries contain only circular muscular fibres, and none that are longitudinal, there is no known structure upon which a nerve could act to dilate such vessels. For this, among other reasons, the dilatation of capillaries has been regarded as due to a paralysis of the constricting nerves. Yet the chorda tympani of the facial nerves would seem to be an actively-dilator-vaso-motor nerve; and the question remains in doubt.*

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[*] Vulpian; who makes his statements with judicial caution, and in this especial instance, upon the authority mainly of his own researches, those of Claude Bernard, Schiff, and Lyon.—*Leçons sur l'appareil vaso-moteur. Paris,* 1875. *t. I., p.* 193.

[†] It is surprising to see how authors differ in regard to the extent of what is called the "cilio-spinal centre." Budge and Waller, for instance, speak of it as extending from the 6th to the 2d dorsal vertebra, while Claude Bernard puts its limits as the 6th cervical and the 7th dorsal, and Schiff would carry the region through the cervical cord into the medulla oblongata, mistaking the strands of communication with the higher portions of the nervous axis for the centres. The boundaries in the text are those given by Vulpian, and have seemed to me, after careful examination of the subject, to be the most exact.

This same spinal district is also the birth-place of involuntary fibres going to the pupils, certain ocular muscles, and the nostrils; and these also present, therefore, marked phenomena after the destruction of the centre. The pupil contracts, and is no longer perfectly circular; the palpebral opening becomes narrower, more elliptic in shape and more oblong in a transverse direction; the globe of the eye is markedly retracted within the orbit; and the nostril is slightly collapsed. These fibres, as it thus appears, are distributed to muscular tissue, but it is not the muscular tissue of blood-vessels. There is, it is true, some difference of opinion as to whether the pupillary contraction is due to a paralysis of the radiating fibres of the iris, or as to whether there is not at this place a vascular circlet whose alternate plethora and ischæmia produce the varying conditions of the pupil; but the first view has by far the greatest weight of evidence in its favor. The remaining phenomena, how ever, are undoubtedly the result of muscular defects, notwithstanding that they are generally regarded as of vaso-motor origin, and, therefore, spoken of in conjunction with the capillary dilatation of the head and face that follow destruction of the cilio-spinal region. Claude Bernard has shown that capillary contraction or dilatation has no effect upon the contractility of a muscle.† We must conclude, hence, that these are the involuntary filaments going, in the first place, to the orbicularis palpebrarum, their paralysis causing the change in the palpebral opening; proceeding, in the second place, to what is known as the orbital muscle, non-striated, situate within the orbital cavity, around the globe, and maintaining by its tonicity a certain degree of propulsion of the globe; * and distributed, in the third place, to the fine muscles of the nostrils.

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* For a full bibliography of this branch of the subject, see Foster's Physiology, 1880, p. 220, and Vulpian, l'Appareil Vaso-moteur, t. I., p. 146, et seq.

† Système nerveux, t. II., pp. 35, 472, 499, Paris, 1858.

Similar fibres have their cells strewn throughout the length of the spinal gray matter, and the future will doubtless bring more to light than we now know concerning them. Thus, the innervating cells of the dog's bladder are, according to the researches of Gianuzzi, † at the level of the 3d and 5th lumbar vertebræ. Budge has mapped out the cells which regulate the organs of generation as being at the level of the 4th lumbar vertebræ in the rabbit. Irritation at this point produces uterine contractions in the female, erection and ejaculation in the male. The cells appertaining to the rectum are situated, if we may trust Masius and Van Lair, at the level of the 6th lumbar vertebræ in the rabbit. ‡ So-called "sweat-fibres" have been found to run in the sheath of some of the nerves, and presumably to arise from the cord. § The "lymph-hearts" of the frog—minute, contractile bodies, lying upon the lymphatic vessels in batrachians, reptiles, and certain birds and fish—are innervated from the spinal cord. ‖ Finally, if the deductions be correct that I have drawn from investigations of my own, there are certain involuntary fibres given off from the cord that terminate in voluntary muscles, subserving some unknown purpose,

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* J. L. Prévost, Recherches anat. et physiol. sur le ganglion spheno-palatin (Arch. de physiol., 1868, pp. 220, et suiv.).

† Journ. de la physiol., Paris, 1863, t. VI., p. 22.

‡ Journ. de l'Anatomie, 1868, t. V.

§ Foster, op. cit., p. 402.

‖ Ibid, p. 609; Ranvier, Anatomie Générale, Progrès Médical, 31 Mai, 1879.

possibly that of muscular tonicity.* This is demonstrated by the "tendon-reflex," which is abolished in the quadriceps extensor of the rabbit by destruction of the cord between the 5th and 6th lumbar vertebræ. And it is proper to remark that, whilst we are not warranted in applying this precise localization as determined in animals to the human being, there is yet a very close analogy, and physiology has in these particulars been an exceptionally reliable guide to pathology.

This completes our study of the gray matter of the spinal cord. We have come to learn that each group of cells—perhaps each cell—in this gray matter represents a certain kind of intelligence; and that these cells are probably in communication with one another by means of white fibres. It is the sum total of these intelligences that imparts to the cord its characteristics as an organ. As each one of these cellular groups and its inherent intelligence is more or less independent of all others, so the combined intelligence of the cord's gray matter is independent of the combined intelligence of other collections of gray matter; and it is a recognized fact that the spinal cord has a "function" of its own. This has been exemplified by experiments upon headless frogs and decapitated human beings. Cut off the head of a frog, permit it to recover from the shock of the operation, then pinch its skin, and it will hop away; or, throw it into water, and it will swim. Place a drop of acetic acid upon the belly of such a frog, and it will endeavor to brush away the irritation with one foot. Now amputate the leg of this foot at the knee. The animal will make several futile attempts to reach the irritated spot with the stump; and, failing, will, after some hesitation, make use of the uninjured limb for this purpose. I have been able to repeat this well-known experiment of Pflüger's.* Robin witnessed some most instructive phenomena in a criminal whose head had been removed an hour previous at the level of the 4th cervical vertebræ. The skin around the nipple was scratched with the point of a scalpel. Immediately there ensued a series of rapid movements in the upper extremity, which had been extended upon the table. The hand was brought across the chest to the pit of the stomach, simultaneously with a semi-flexion of the forearm and inward rotation of the arm—a movement of defense, as it were.† All this teaches us the more clearly to understand that it is the intelligence of the cord's gray matter that is called into play in a thousand actions that must take place without the aid of that *conscious* intelligence which we call mind. The intelligence of the spinal cells is quite sufficient to enable men to walk, to play on musical instruments, to become experts in handiwork, to ride on horseback, whether awake or asleep, to become acrobats, to unconsciously acquire such a handwriting that its minute peculiarities shall be unerringly recognized by the trained eye. Let us endeavor to analyze the *rationale* involved in every one of these processes. We will take the case of Pflüger's headless frog. From the spot on the belly which has been irritated by the acetic acid, an impression is carried inward to the cells in the spinal gray matter. This impression is appreciated by these cells with sufficient intelligence to cause an impulse of motion to be sent forth to the muscles of one foot, which is made to attempt a brushing away of the irritation. When this limb has been amputated at the knee, and several futile attempts have been made to reach the belly with the mutilated member, the impression of these attempts and of their futility is carried inward to the spinal cells, which are intelligent enough to recognize these facts and their bearings, and to originate the muscular movements of the sound limb that shall effect the purpose of reaching the sore spot. It is simply a reception by a cell of an impression from without, a comprehension in varying degree by that cell of the import of the impression, and a projection of molecular action from that cell to other cells, resulting in purposed movements. As each cell has its organic limitations, the intelligence of each cell must be correspondingly restricted.

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* The Tendon-Reflex: Its Prevalence and its Physiology. Journ. Nerv. and Mental Dis. April, 1879.

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* Pflüger, Die sensorische Function des Rückenmark's, 1853.

† Journ. de l'Anat. et de la Physiol., Paris, 1869, p. 90.

Having considered the gray matter of the cord, we can now turn our attention to the white matter in which the gray columns are sheathed. It must always be distinctly understood that the essential constituent of this white matter is nerve-fibre, and that it is, therefore, made up of conducting strands, which on the one hand connect cellular groups at different levels in the cord, and on the other hand bring the spinal gray matter into communication with the masses of gray matter within the encephalon. It has, therefore, no intelligence, no "function," of its own; it is simply a conductor of the intelligence of the gray matter with which it is connected; and symptoms resulting from its lesion are symptoms resulting from an interruption in this conduction. It is portioned off into longitudinal strands of varying size, the so-called "columns," each of which is distinct from its neighbor in the period of its development, in its physiological and in its pathological reaction. Flechsig, of Leipzig, having observed that these different columns and their intracranial continuation become clothed with the medullary substance at different periods of fœtal and early infantile life, has made use of this fact to outline their course and dimensions. He has made microscopical examinations of the brain and cord of some sixty fœtuses. As his diagram of the cord, made in accordance with these researches, tallies exactly in many particulars with our positive pathological knowledge, it should be, and is fast coming to be, recognized as the most authoritative exposition of the subject, and I have thought best to make use of it for the purposes of this article.

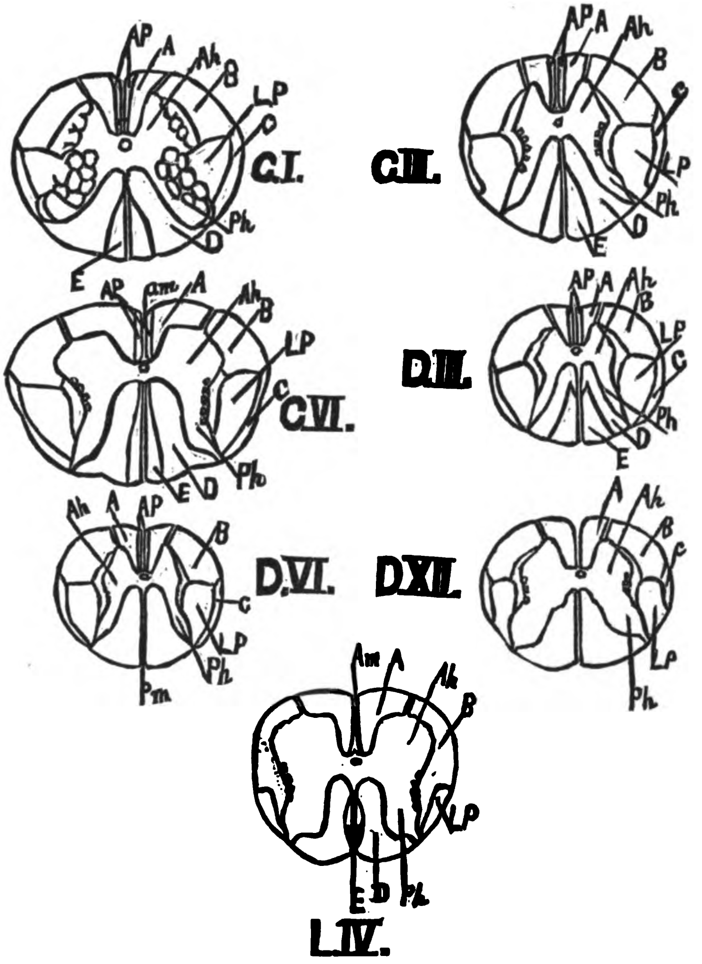

PLATE II.

DIAGRAMATIC SECTIONS OF THE SPINAL CORD.

After Flechsig.

C.I., C.III., etc., denote the nerves at whose levels the sections were made. *Am.*—Antermedian fissure. *A.*—Anterior fundamental Column. *B.*—Lateral Column. *D.*—Direct Cerebellar Column. *A P.*—Anterior Pyramid, or Column of Türck. *L P.*—Lateral Pyramidal Column. *Ah.*—Anterior Horn. *P h.*—Posterior Horn. *D.*—Column of Burdach, or Posterior Root-Zone. *E.*—Column of Goll. *Pm.*—Posterior Median Septum.

The plume-shaped columns on each side of the posterior median septum are the Columns of Goll—Plate II., *E.* It is not known with what masses of gray matter they are connected, and their rôle is therefore unknown. There is but one case on record in which they were alone diseased.*

Between the diverging posterior cornua and the Columns of Goll are the Columns of Burdach, or the Posterior Root-Zones, as Charcot terms them (*D*). The fibres from the posterior or sensory roots of the spiral nerves enter directly into them, and not into the posterior horn, as is generally figured. They are supposed to bring cellular groups at different levels into communication with one another, and thus harmonize or co-ordinate the actions of different masses of gray matter. Disease of these columns gives rise to the symptoms of locomotor ataxia, and to certain slight nutritive disturbances of the skin.

The Lateral Column proper is as yet a mystery, except that it is connected with motion and not with sensation (*B*).

The same remark will apply to the Anterior Fundamental Column (*A*).

The thin, irregular strand upon the periphery is the Direct Cerebellar Column (*C*), and is the path of conduction, according to Flechsig, between the cerebellum and the cord.

On each side of the anterior median fissure is the Anterior Pyramidal Column, or the Column of Türck (*A P*), and laterally is what is known as the Lateral or Crossed Pyramidal Column (*L P*). Of these I propose to speak more in detail at a later stage of the evolution of my subject.

As regards its active phenomena, every nervous organism may be divided into a half that subserves the purposes of sensation, and a half that subserves the purposes of action—into sensory and motor portions. The spinal cord is no exception to this rule. All the region embraced between the anterior median fissure and the anterior margin of the posterior horns, including the anterior horns, is connected with motion, and is called the *kinesodic system.* All the rest of the cord, inclusive of the posterior horns, is connected with sensation, and is called the *æsthesodic system.*

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* Pierret—Note sur un cas de sclérose primitive du faisceau médian des cordons postérieurs. Arch. de physiol., 1873, p. 74.

This independent organism, the spinal cord, is in intimate relation with another independent organism, the cerebrum. The multitudinous forms of intelligence that are innate to the spinal cord—that which regulates motion and sensation, that which is so necessary to nutrition, that which rules the posterior lymph-hearts, that which determines the action of the viscera, that which contracts or expands the capillaries, those in which centre a thousand nervous phenomena as yet undreamt of or but half understood—all these, known through so many years as automatism, are to be brought in subjection to those still more multitudinous and complex forms of intelligence which are included under the generic name of "mind."

You do not need to be told that the cortex of the cerebral hemispheres is the seat of the mind, by which we mean to say that the structural integrity of the cortex is essential to the proper manifestations of mind. Fissured and convoluted, this supreme mass of gray matter is spread like a canopy over the strands of white fibres coming from beneath and expanding as they near their termination. It is my province to consider only the motor tract ascending from the cord, and ending in what are known as the motor convolutions. The revolution in cerebral physiology that was inaugurated in 1870, by Fritsch and Hitzig,* and that has been borne forward so assiduously and successfully by Hitzig,† Ferrier, Carville and Duret, and an army of other investigators, must be more or less familiar to you all.* Before entering upon the details of this modern physiology of the cortex, we must dwell for a moment upon the somewhat more venerable but still modern topography of the same organ.

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* Uber die elektrische Erregbarkeit des Grosshirns, von G. Fritsch u. E. Hitzig, Arch. f. Anat. Phys. u. w. Med. von Reichert u. Du Bois Reymond, 1870, Hft. III, S. 300.

† Untersuch. über das Gehirn, Berlin, 1874.

The Fissure of Rolando (*C*, Fig. 7) is the sulcus that runs from about the centre of the great longitudinal fissure downwards and forwards towards the base of the brain. The Fissure of Sylvius (*S*) is the sulcus that takes its way from the base of the brain, behind the origin of the olfactory nerves, upwards and backwards; a short, steeply- and anteriorly-ascending depression makes junction with it near the base, and is known as the anterior or ascending branch (*S*″), whilst the remainder of the fissure is designated as the posterior or horizontal branch; and the territory embraced by these two branches is the operculum, or "cover" to the tissues lying within the depths of the main fissure.

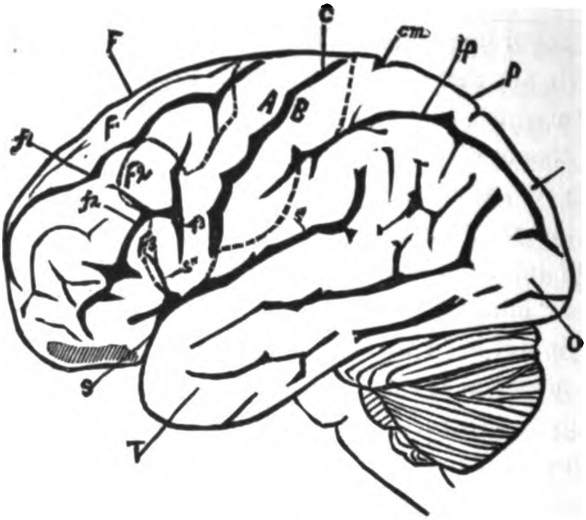

FIG. 7.

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* A full bibliography of the extensive literature of the subject can be found in the Révue des Sciences Médicales, etç. Janvier, 1879, p. 298, by H. Rendu.

The Fissure of Sylvius and the Fissure of Rolando may justly be regarded as the two principal fissures of the cortex, and they are also among the earliest that are developed in the fœtal brain, the former appearing at about the third month, and the latter at about the fifth. They are certainly the most salient and the most appropriate from which to take our departure in studying the others. All that portion of the hemisphere anterior to the Fissure of Rolando is the frontal lobe; whilst that region which is posterior to it and above the Fissure of Sylvius is the parietal lobe, with the exception of the extreme tip posteriorly, to which the name of the occipital lobe has been given. The territory inferiorly to the Fissure of Sylvius belongs to the temporal or temporo-sphenoidal lobe. It will be observed that the Fissure of Rolando is the only large one that *ascends;* all the other fissures having a direction more or less horizontal. This remark necessarily applies also to the convolutions that border it; of which the anterior one (A), belonging to the frontal lobe, is known as the ascending frontal convolution, whilst the posterior one, which is a part of the parietal lobe, is called the ascending parietal convolution. The fissures extending more or less horizontally along the frontal lobe are the upper (f^1) and the lower (f^2) frontal fissures; the vertical frontal fissure (f^3) runs at right angles across the inner end of the lower frontal. The convolutions of these fissures are designated numerically, from above downwards. The one above the upper frontal fissure, between it and the great longitudinal fissure, is the first frontal convolution (F_1); that between the upper and lower frontal fissures is the second frontal convolution (F); that between the lower frontal fissure and the Fissure of Sylvius is the third frontal convolution (F_3). Let me add that when the lips of the Fissure of Sylvius are pressed apart, a number of minor convolutions will be seen ridging the surface of a hillock of gray matter at the bottom of the sulcus, this mound-like elevation being the Island of Reil; and this will be all of the cortical topography upon which the title of my paper will permit me to linger. With the action of the remaining convolutions in health and disease we are by no means so accurately acquainted.

The gray matter of certain of these convolutions forms the supreme terminal stations of the motor nerve-fibres that have come up from the spinal cord. These are the "motor convolutions." If I remove the skull-cap of a rabbit, expose its motor convolutions, and irritate them with a mild current of electricity, there will immediately ensue a series of muscular movements, that will continue as long as the irritation lasts. The same experiment has been performed with like results upon other animals, even upon monkeys; and a sufficient number of pathological cases has rapidly accumulated to enable us to distinguish with some show of accuracy those convolutions in the human brain, in which disease induces muscular spasms or paralysis. These human motor convolutions, as far as we are now warranted in making a positive statement, are the ascending frontal and parietal, and the bases of the three frontal. The irregular outlines of this region are delineated by the dotted lines in Plate IV. A more exact localization, as of the so-called "centres" for the limbs and facial muscles, is frequently given by those who speak with authority; but I do not think that our present knowledge will warrant us in attempting more than a general outline such as I have ventured.*

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* I have not alluded in the text to the researches of my friend, Dr. Royal W. Amidon, according to whom the motor area extends far beyond what I have indicated. This omission has not been because of any scepticism on my part. Dr. Amidon's experiments were made by means of cerebral thermometry, a method whose exact value I have been enabled to demonstrate to the profession; and they have been made with such care in other particulars that I am quite prepared to accept them as facts. But the ink has barely dried upon his article, and I do not consider myself justified in putting them into the category of accepted facts until careful discussion and verification have stamped them with the imprimatur of the profession. Vide Arch. of Med., April, 1880.

From the motor convolutions the motor fibres pass downward, converging as they descend toward the large mass of gray matter at the base of the brain, the corpus striatum, consisting of the caudate and lenticular nuclei.* Traced

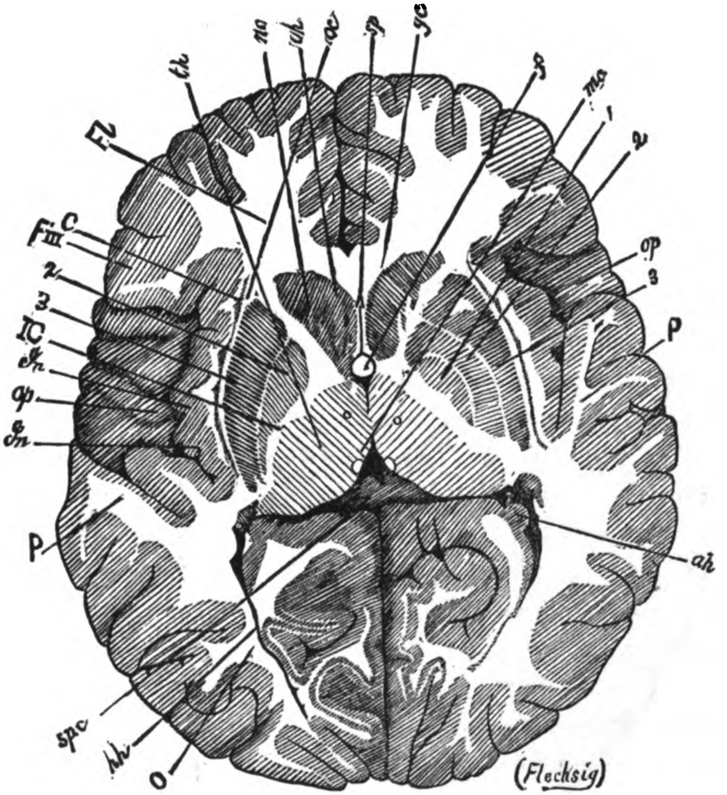

FIG. 8.

HORIZONTAL SECTION THROUGH THE BRAIN OF A CHILD NINE MONTHS OLD. ON THE RIGHT SECTION IS AT A LOWER LEVEL THAN ON THE LEFT.

1, 2, 3.—1st, 2d, 3d segments of nucleus lenticularis. *Op.*—Operculum. *P.*—Parietal Lobe. *Ak.*—Ammon's horn. *mc.*—Middle commissure. *f.*—Fornix. *sp.*—Septum pellucidum. *vk.*—Anterior horn of lateral ventricle. *nc.*—Nucleus caudatus. *tp.*—Thalamus opticus. *Fl.*—Frontal Lobe. *oc.*—Outer capsule. *C.*—Claustrum. *F III.*—3d Frontal Convolution. *IC.*—Inner Capsule. *In.*—Island of Reil. *kk.*—Posterior horn of lateral ventricle. *O.*—Occipital Lobe. *gc.*—Genu of the corpus callosum. *sp. c.*—Splenium of corpus callosum. *k.*—Strand from Inner Capsule to apex of Occipital Lobe. *lm.*—Laminæ medullares of the nucleus lenticularis.

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* There is a lamentable confusion about these terms. The corpus striatum may be—most properly as, I think—described as above. By the Continental writers the caudate nucleus is called the corpus striatum, and the lenticular nucleus is described apart. In the older works on anatomy the corpus striatum was regarded as one unbroken mass of gray matter.

from the base upwards, they expand like the spokes of a fan, and are known as the "radiating crown," the corona radiata. Certain fibres pass into the caudate and lenticular nuclei, and others arise from their lower surface. As the latter are much fewer in number than the former, the great German teacher Meynert regards these ganglia as "stations of reduction," or, Reductionsstätten.

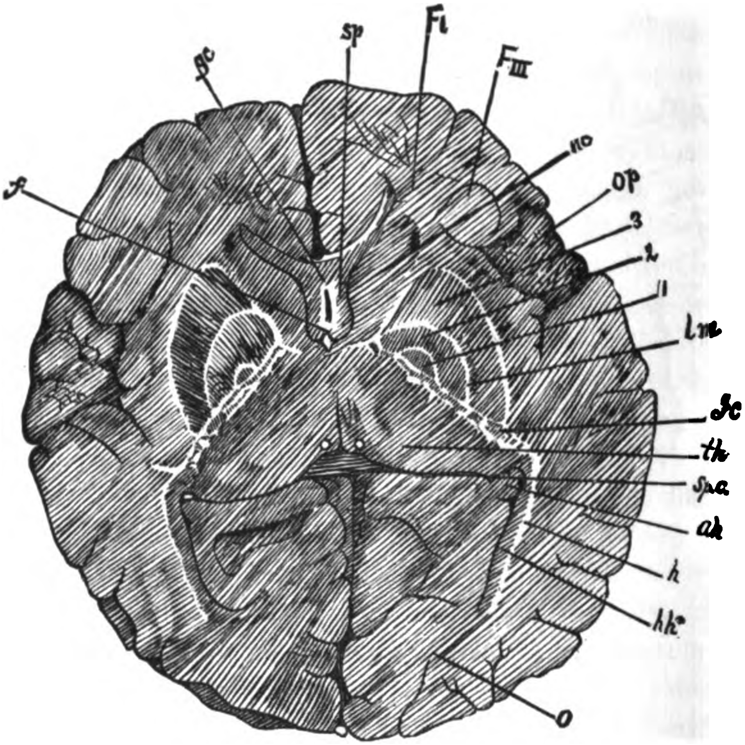

FIG 9.

HORIZONTAL SECTION THROUGH BRAIN OF CHILD TWO DAYS OLD. INNER CAPSULE AND LAMINAE MEDULLARES OF THE NUCLEUS LENTICULARIS CLOTHED WITH MYELINE. SECTION DEEPER ON LEFT.

(See p. 403 for description.)

The white strands that intervene between the nucleus caudatus and the optic thalamus on the inner side, and the nucleus lenticularis upon the outside, have received the collective name of *internal capsule* (Figs. 8 and 9, *IC.*) The anterior two-thirds of the internal capsule contain the motor fibres, whilst the posterior third consists, it may be said in passing, of sensory fibres. This anterior portion receives the motor fibres from the ganglia, but the most of its bulk is made up of fibres that are direct continuations of the corona radiata above passing to the regions beneath. Thus, as is evident, the motor tract which we are considering forms the anterior two-thirds of the internal capsule, yielding up, on its downward way, fibres to the caudate and lenticular nuclei, and receiving from them a lesser number. The motor tract then proceeds to the crura cerebri at the base of the brain, occupying their anterior portion, the *crusta;* penetrates to the Pons Varolii; constitutes the pyramids of the upper oblong end of the spinal cord, the oblong medulla; and thus arrives at the region of the decussation, some of its fibres passing down the opposite side of the spinal cord through the Lateral Pyramidal Columns (Plate II, *LP*), whilst a portion descend upon the same side in the Columns of Türck (Plate II, *AP*). Here we must again pause to discuss a few details of interest.

Until within a short time, anatomists have assumed that the decussating fibres were always of the same number relatively to the non-decussating fibres. Among the most important of the discoveries, however, for which we are indebted to Flechsig, is the one that this proportion is extremely variable. He found two extremes. In the one, all the fibres of the motor tract entered the Lateral Pyramidal Columns of the opposite side of the cord, there being no Column of Türck. In the other, only 10 per cent. passed to the Lateral Pyramidal Columns, 90 per cent. descending upon the same side in the Columns of Türck. Between these extremes all manner of variations may exist. He gives the following table of the variations:

1. Total decussation (cases of entire lack of the Columns of Türck).
2. Semi-decussation of one Pyramid, with total decussation of the other.
    - *a.* Semi-decussation of the right Pyramid.
    - *b.* " " left "
3. Semi-decussation of both Pyramids.
    - *a.* Less than 50 per cent. of each Pyramid or of both remains non-decussated.
    - *b.* More than 50 per cent. of each Pyramid or of both remains non-decussated.[*]

This discovery disposes of what is seemingly the most insurmountable objection to the waxing doctrine of cerebral localization. M. Brown-Séquard has collected, with his usual energy and enthusiasm, a large number of cases to prove that lesions upon one side of the brain will sometimes produce paralysis upon the same side of the body; and, assuming in the bygone fashion that all motor fibres decussate, he believes that he has also proved the untenability of the doctrine of cerebral localizations. It still remains for M. Brown-Séquard to prove that the motor tracts of his cases did not vary as Flechsig has shown us they may do.[†]

The gray matter of our cortex is now in communication with the gray matter of our spinal cord. The cells of this cortex may now speak, in their molecular tongue, to the cells of the spinal gray matter. The more exalted forms of intelligence which we know as "mind" are connected along protoplasmic highways with the lower forms of intelligence to which has been given the confusing term of "automatism." My task is done. In accomplishing it, I have been enabled to speak of many phenomena that explain many other phenomena in health and disease, and I have passed over much that must be fruitful of thought to the thoughtful investigator of disease at the bed-side or in the post-mortem room. In a feeble and indirect sense, it can be said that no tissue of the body is independent of the others; but the nervous system is pre-eminently the one that exercises the most wide-spread power, for the simple and evident reason that its connections are the most widely extended. From the humble and silent influence that regulates the flow of saliva from a buccal gland to the superb manifestations of mental force that send a man's name sounding down the ages, we witness the outcome of nerve cells. Whatever benefit may come to us from the clear-sighted, unprejudiced recognition of facts must come to us from the acceptance of these truths. And in presenting to you this scientific grouping of facts, I have been animated by the hope that they would prove of service when, as artists, you might make utilitarian application of them in going abroad upon your clinical rounds.

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[*] Op. cit. S. 272, 273.

[†] It will have been noticed that nothing has been said in regard to the paths of transmission of sensation and motion in the spinal cord. Brown-Séquard's experiments, according to which the gray matter of the cord is said to be in part the path of this transmission, are to me inexplicable, inasmuch as they make gray matter *conduct*—a something that can only be done by white matter, if we may trust facts in general. Moreover, they are flatly contradicted by the researches of Miescher (Ludwig's Arbeiten, 1870, p. 172) and Woroschiloff (Ber. über die Verhandl. der König. sächs. Gesellschft. Mathem. Phys. Classe, 1874, III., IV., V.. S. 248), which are much more in consonance with accepted physiology and pathology. Conduction of sensation is along the white columns of the æsthesodic tract, conduction of motion along the white columns of the kinesodic tract; this will, I think, be a justifiable statement in the present state of our will knowledge, and be confirmed by the future.

Society Reports.

STATED MEETING, JULY 19, 1880 (CONTINUED).

WOUND OF PROSTATIC URETHRA.

FRANK W. ROCKWELL, M. D.

Dr. Frank W. Rockwell presented a specimen of enlarged prostate, with the following history:

Mr. G. H. P., an unusually vigorous man of 74, but whose natural strength had been much impaired by severe recent injuries, was attacked with retention of urine on the morning of June 23, 1880, 4.30. To relieve this he attempted to pass what he supposed to be a catheter, but which was in reality a solid bougie No. 20 F. The passage of the instrument caused severe stinging pain in the prostatic urethra, vesical tenesmus and a copious hæmorrhage. Becoming alarmed, he sent for me, as his own physician, Dr. A. J. C. Skene, resided at too great a distance to be summoned in an emergency. Having had occasion to examine Mr. P. two years previously for a similar attack following a severe injury to the back and nates, I had ascertained the existence of moderate prostatic hypertrophy, and at once suspected the nature of the accident which had just occurred. Rectal examination showed an enlargement of both lateral lobes, the transverse diameter being from 5 to 6 centimètres. The anus was surrounded by a ring of inflamed and exquisitely sensitive hæmorrhoids, and the perineal and bulbar muscles were so irritable as to render every attempt at manipulation painful. A careful attempt to pass Jacques' and Mercier's catheters Nos. 16 and 18 F. failed, and a free hæmorrhage ensued as soon as their extremities reached the prostatic urethra. Waiting until this had ceased, I passed a silver Thompson's over-curved prostatic catheter (20 F.) gently down to the neck of the bladder, and, keeping the point of the instrument closely applied to the roof of the canal, entered the viscus with comparative ease, noticing a marked deflection to the left (patient's) as the neck was passed. About 1¾ pints of clear acid urine were withdrawn, to the great relief of the patient. At 5.30 P. M., as the patient was in great pain and the bladder again filled, another attempt to relieve him was made with soft instruments. Again the hæmorrhage came on from their presence in the urethra, and again I resorted to the silver instrument. Now, however, I found it impossible to introduce it, as the canal was occluded, either by blood-clot or congestion, about the neck of the bladder, due to the wound inflicted in the morning.

At 8.30.—The intervening time having been spent in efforts to subdue the hæmorrhage, which had been pretty active, and was now controlled, I aspirated the bladder, withdrawing about 1½ pints of bloody urine. This, upon examination by the microscope, gave no evidence of any renal disease. Albumen, probably due to presence of serum, was found in small quantity.

At 11.30.—Dr. Skene, who had visited the patient at noon, saw him again in consultation with me, and agreed as to the propriety of deferring all operative measures for the present, trusting to subsidence of swelling and inflammation for restoration of the route to bladder.

The diagnosis made was laceration or puncture of enlarged medium lobe of prostate, with congestive swelling and obstruction of contiguous urethra, and as no sign of urethral lesion or urinary infiltration existed, we felt justified in postponing all measures which might complicate the case. Ice, milk and small quantities of brandy were given during the night, with iodoform and morphia per rectum.

June 24th. The patient had passed a pretty comfortable night. At 9 o'clock he expressed a wish to rise, walked to a chair, and sat down in it, falling almost immediately into a deep sleep, from which he could be with difficulty aroused. His skin was moist and warm, pupils slightly dilated, and respirations 32. No cyanosis or stertor. He had been perfectly rational during the night, and up to the moment when he fell asleep. To both Dr. Skene and myself his symptoms, while grave, seemed to present no cause for immediate alarm. As the pulse was extremely feeble, stimulants were freely administered by skin and rectum. A pint of bloody urine was withdrawn from the bladder by aspiration, and directions given to stimulate freely until the next visit.

At 1 P. M. Patient improving.

At 5:30. Steadily improving, but complaining of pain in the lumbar region. Bladder almost empty.

June 25th. After a fair night's sleep, patient still felt no desire to urinate; bladder about in condition of day previous; kidneys evidently acting incompletely, if at all; skin covered with profuse perspiration, and faint urinous odor perceptible. Pulse full and regular, mind clear. In consultation determined to apply spongio-piline wrung out of warm water and laudanum to back, and to give digitalis and stimulants internally.

At 10 P. M. Bladder had filled sufficiently to give patient uneasiness, and I again aspirated, withdrawing about a pint of bloody urine. After the operation he fell asleep, taking milk or stimulants occasionally through the night.

June 26th. Patient feebler and evidently sinking; complained of exhaustion and want of air. A slight diarrhœa set in, and the skin was covered with perspiration. Kidneys acting sluggishly. Bladder flabby and slightly filled.

June 27th, 10:15. Bladder had slowly filled during night, and I aspirated again in Dr. Skene's presence, withdrawing a ℥ xii of dark fluid resembling porter. After emptying the bladder I injected a few ounces of warm water through the needle, and withdrew a portion almost clear. The patient remained about the same during the day, failing steadily. Toward evening asked for a little iced water, swallowed it, and then, lying back on his pillow, suddenly ceased breathing, and died without a groan.

Autopsy. Forty hours after death, by Dr. B. F. Westbrook.

Heart firmly adherent by posterior surface of left ventricle to pericardium, accounting for irregular and feeble action of organ noticeable during last years of patient's life. (Cause unknown.)

Kidneys. Left comparatively healthy. Ureter dilated for 1½ inches above insertion into bladder. Right congested. Both contain cysts.

Genito-Urinary Tract. On laying open urethra, its bulbous portion was found filled with clotted blood, while the prostate, enlarged to the size of a small orange, pressed well back into the rectum.

Its middle lobe was hypertrophied to the size of a small fig, and projected up into the bladder, thus forming a sort of ball valve, and offering a direct obstacle to any straight instrument passed *per urethram.* At its junction with the prostatic urethra was a laceration, directly into its substance, occupying a position about 1 or 2 centimetres above the level of the urethral floor.

All the pelvic and abdominal viscera were matted together with bands and adhesions, due to old peritoneal inflammations, accounting for the intolerance of the bladder to the presence of comparatively small quantities of urine. *No* *trace of the punctures made in the bladder could be found post mortem.*

ON THE COMPARATIVE VALUE OF SULPHURIC ACID AND CREOSOTE IN THE TREATMENT OF ALVEOLAR CARIES.*

J. N. FARRAR, M. D.

When or by whom creosote was first used in the treatment of alveolar caries I am not able to say, but as to sulphuric acid, as well as nitric acid, we find, according to Heister, who wrote in 1718, one hundred and sixty years ago, that it was then in use in the treatment of necrotic conditions of the jaw-bone. Since that time it has been more or less advocated, but with somewhat more interest, after the report of Mr. Pollock's experiments in 1868–69, published in the *Lancet*.

For several years past, and until of late, the use of sulphuric acid, more especially in the form of elixir of vitriol, has been advocated by a few members of the dental profession, as the treatment *par excellence* not only for necrosis, but for alveolar abscess, the hypothesis set forth as positive theory by these gentlemen being that "acid would vigorously act to remove all the dead bone present without acting upon the surrounding living bone."

To test the real degree of virtue of aromatic sulphuric acid, I made, in 1866–7, a long series of experiments with not only this form of acid preparation, but various degrees of aqueous solutions of all sorts of sulphuric acid, the commercial (always impure †), the Nordhausen, and the absolutely pure ordinary acid (prepared especially for my use). These experiments numbered about 200, made with great care, consuming almost all of my spare hours, days and nights for over a year, and were not only made upon all conditions and forms of lifeless bone, but included vivisection experiments upon sheep. The results showed that aromatic sulphuric acid has little or no effect for disintegrating bone of any sort, and that while dead bone long enough subjected to aqueous solutions will be affected by them, they act equally vigorously upon living bone; thus proving beyond doubt that, however plausible and however desirable the hypothesis set forth, it had but very little scientific foundation.

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* Read before the Society, May 17, 1880.

† Sulphate of potassa, sulphate of lead, hyponitric acid, arsenic, and chlorine are the usual impurities found even in the best commercial acids.

Sulphuric acid is highly recommended by some persons for universal use in all conditions of abscess; but while it will frequently lead to fair results, and while it is undoubtedly to be preferred to creosote in cases of necrosis, I do not think its indiscriminate use in the treatment of simple abscesses, even though it be slightly antiseptic, is in accordance with the highest scientific principles.

Creosote has all the desired properties of sulphuric acid, which are indicated in the treatment of simple abscesses; with far superior antiseptic qualities; and as alveolar abscesses are not, as a rule, accompanied by necrosis proper, the former is superior for general use.

Even in the cases where acid is indicated, the final dressings, after the dead bone has been removed, may profitably be made with wood creosote, in order to secure its great antiseptic virtues, for the dead root is ultimately to be clothed like an encysted foreign body by the encroachment of the alveolar walls or the intermediate softer tissues, either by contracting around it, or by granulations or otherwise, thickened so as embrace it.

Two varieties of creosote should be considered: escharotic and non-escharotic. Wood creosote is practically non-escharotic, and while this form may be superior for some cases where it is not desirable to destroy tissue, I think it is not equal to the other form in early stages of treatment, when destruction of the interior of the sac is indicated.

While creosote preparations are thus highly recommended for general abscess treatment, it is of the utmost importance that a correct diagnosis be made. Should there be even slight necrosis present, the solution of the dead bone, so important to a final cure, will, for the time, be apt to be arrested by the use of creosote. I have known cases to be only apparently cured by this mistake. The disintegrative process and pus formation for a time being arrested, and the fistula closed, there is produced what may be termed a "false cure," which remains only so long as the effect of the creosote prevents further decomposition of the dead tissue.

It is sometimes a nice point to determine whether there be necrosis present or not, when very limited in extent and difficult of access; but skilled examination will generally reveal by means of a delicate probe the difference between living and dead bone. Should there be, however, a doubt in the diagnosis, with strong suspicion of necrosis, it would appear to be a proper rule to give such cases the benefit of the doubt and treat with acid, the form and strength depending upon circumstances.

Having briefly considered the comparative virtues of the two kinds of creosote, let us confine our attention more especially to the acid aspect of our subject. Sulphuric acid, of which there are two varieties—the ordinary (H_2SO_4) and the Nordhausen ($H_2SO_4SO_3$), in its pure state, has not to my knowledge been employed in practice; but the aromatic form known as "elixir of vitriol" has been in general use, as before stated. But in order to obtain a more vigorous action, various degrees of aqueous dilution of the pure acid have been thought to be more efficient in stubborn cases, where dead bone is associated. There are, however, some considerations respecting the acid treatment which, in my opinion, are of importance. Different and perhaps exaggerated views are entertained in regard to the relative value of the ordinary and the Nordhausen forms. This, however, only applies to the difference in degree of strength, and both may be used under the above modifications in aqueous solution; but in alcoholic (aromatic) solutions the Nordhausen is stronger, and acts more vigorously to destroy living soft tissues.

Chemical experiments upon dead tissue, outside of the living organism, as illustrative of similar conditions in the living, are always open to criticism, often absurd, especially in the direction of physiological chemistry. The chemical action of acids, even upon dead bone in and among living tissue, has been, and is by some people now, supposed to be somewhat different from their action upon outside dead matter.

How much and in what way so-called "vitality" influences the action of chemical agents is not well known. I will not attempt to discuss the question. Many of these physiological queries are sometimes satisfactorily answered, but only on the basis of hypothesis. It is my belief that the difference in conditions of experiments is not so much a difference of kind of chemical action as a difference in the degree. We have dead and dying ossific tissue, and wish to prevent further extension of death, and get rid of the dead portion. What shall be done? Is there anything that will, when applied locally, hasten decomposition of the dead bone, and at the same time stimulate diseased living tissue to healthy action? Can any acid be made to dissolve it or not? And if so, will it dissolve the dead bone without acting similarly upon the living bone; and if so, can it be used in sufficient strength without injury to the surrounding soft tissues; and if so, to what degree and what preparations are best for practical use? Some of these questions I have already partially answered. Of course, in my remarks, it should always be borne in mind that systemic treatment, such as food and sunlight, have their influences in the formation of the "line of demarkation," as well as that of judicious general medical treatment.

Experiments show that necrosed bone may be acted upon, other things being equal, as well *within the jaw as without;* but in actual practice "other things" cannot be made equal; therefore allowances must be made—and great allowances, too. So far as the action of acids upon dead bone is concerned, we have the matter in a nutshell. Experiments show that necrosed bone can be dissolved by the use of some solutions of acid, but these experiments have led me to conclusions somewhat at variance with those generally held, especially in regard to the degree of value of the different forms of sulphuric acid. The unavoidable surrounding conditions in actual practice necessarily retard, if they do not interfere with, the action of chemical agents applied from without, even if an effort to retain them in place by the Heister method of the use of the tents of lint or cotton be made.

A sequestrum placed in a bottle containing an abundance of aqueous acid solution (although not at first) will, after from two to four hours, show decided chemical action upon it; but in practice, if we apply the same drug in the treatment of necrosis, the quantity must necessarily be very limited and also weak. The presence of detritus in and around the necrosed parts, and the natural secretions of the same will so soon dilute and drive out this small quantity as to materially reduce the degree of chemical action.

These hindrances, added to the lack of time required to obtain full action of the acid in actual practice, would lead us to infer that if the soft tissues would tolerate it, a stronger solution would be necessary to accomplish the same degree of chemical action which a larger quantity of a weaker solution would do in the laboratory. A solution of about four parts of water to one of acid will not act upon necrosed tissue in the living jaw more than, if indeed as much as, a solution of about nine parts of water to one of acid on similar bone outside of the body, if kept at the temperature of the blood. Therefore, it would be natural to infer that to obtain more active results, the local application of acid in practice should be frequent. But the action of pure acid being very destructive to living tissue, we are obliged to use weaker forms in practice. But a strength of solution that will not destroy living tissue is so weak that, under the difficulties mentioned, it will not have so much disintegrative effect upon necrosed bone as at first might be supposed, unless the necrotic portion is sufficiently exposed to apply the acid directly upon it without coming in contact with living tissue—a condition of circumstances which probably would be better treated with a steel excavator. Yet there is no doubt that the frequent and long-continued use of some forms of solutions of acid will hasten somewhat the decomposition of dead bone, leading to an earlier cure; but whether this decomposition is from direct chemical action on the bone itself or through the increased activity of the vital process carried on by nature, is the question.

If we apply any of these solutions, even the aromatic sulphuric acid, to a case in practice where the necrotic portion can be observed, slight effervescence is noticed to take place for a short time. Now, in the natural decomposition of necrosed bone, the secretions are constantly holding in solution more or less of lime salts, and the carbonate coming in contact with sulphuric acid causes slight effervescence; but it does not extend much beyond the time necessary to change the lime in solution in the pus-detritus; this phenomenon is what has led to the erroneous supposition that it was demonstrative proof that the acid acts vigorously upon the bone itself.

Proof additional that the bone is not vigorously acted upon lies in the fact that, if we subject a piece of necrosed bone in the laboratory to pure aromatic sulphuric acid for three days and three nights, at 37.8° C., we will find, after re-weighing, that it has lost nothing; and while such bone, similarly treated with aqueous solutions of sulphuric acid of equal strength, will in the end be destroyed, the action is so slow at first that the change can only be seen after one or two hours. If this be so, it will readily be seen that, with all the hindrances mentioned in actual practice, we cannot depend much upon its direct chemical action upon bone itself, and upon close observation it will be found that the chief benefit from the acid treatment lies in the stimulation to the surrounding living parts which it effects, thus assisting Nature in her efforts to establish the line of demarkation, the formation of granulations behind the sequestrum leaving the dead bone in a condition to be more easily removed by instruments, and in cases where the sequestrum cannot be reached not preventing its natural decomposition, as would be the case if impregnated with creosote.

As to the comparative value of the aqueous solutions with the elixir of vitriol, circumstances must decide. While in most ordinary cases the aqueous solutions that will not destroy surrounding soft tissues must be so weak, there probably is but little if any difference. But where the bone is accessible, so that solutions may be applied without coming in contact with living tissues, stronger ones, even to the strength of one of acid to four of water, may be sometimes beneficial; but the action of sulphuric acid upon bone is so slow that the more experience I have with it the less faith I have in it as a disintegrator of necrosed bone.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

X.—GUY DE CHAULIAC.

1300—1370.

THE profound gloom of the dark ages was just beginning to yield to the glimmering dawn of modern intellectual light, the long struggle of Christendom against Islam was practically over, Feudalism was on the decline, and the formation of distinct nationalities had already commenced when Guy de Chauliac, the restorer and reformer of surgery, was born.

Neither the precise time of his birth or death is known. It is quite probable that he was born in the last years of the thirteenth or in the very commencement of the fourteenth century. He was a native of the little town of Chauliac, in the diocese of Mende, in Gevandan, on the frontiers of

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Auvergne, in France. It was from the name of this town that his chief cognomen was derived. The name is variously written, Gui de Chaulien, Guy de Chauliac, Guido de Cauliaco, or simply Guido, or Chauliac.

Before proceeding further, I will pause to call the reader's attention to some of the more notable immediate predecessors and contemporaries of Guido in that far-off age—well nigh six hundred years ago. The immortal Dante was still living when Guy was a young man (d. 1321). Chaucer, the father of English poetry, was born in 1328 and died in 1400. John Wyckliffe was living and translating the Bible into English at the same time that Guido wrote his "Grande Chirurgie." Froissart, the celebrated French chronicler, was then actively scribbling the minute details of passing events (1337–1410). Francisco Petrarca, the Italian scholar and poet, was Laureate at Rome (1304–74). Boccaccio, the author of "Decamerone," was another contemporary of the great surgeon.

At this time France was under the rule of Philip IV., V. and VI., while Edward I., II. and III. were the sovereigns of England. It was at the court of the latter that the splendor of chivalry was carried to its highest degree of grandeur. The papal chair had been removed by Clement V. to Avignon, where it remained about seventy years, being returned to Rome in 1376. "Guy le bon docteur" had the honor of being the physician of three successive Popes—viz.: Clement VI., Innocent VI. and Urban V., between the years 1340 and 1370.

Immediately preceding the birth of Guy de Chauliac, flourished Albertus Magnus, Friar Roger Bacon, Petrus de Apono, Arnoldus de Villanova, and his friend, Raymond Lully, all celebrated astrologers, alchymists and physicians. Then also flourished the famous surgeons, Brunus, of Calabria; Theodoric, Bishop of Cervia; Gulielmus de Saliceto, Professor at Verona; and Lanfranc of Milan, who was professor in the University of Paris, and author of a treatise on surgery written in 1296.

Bernardus de Gordonio, author of "Lilium Medicinæ," was Professor of Medicine at Montpellier in 1285, where he taught for a third of a century, and died about the year 1320. Gordon is referred to by Guido, who in certain cases recommended the practice laid down in his *Lily of Medicine*. John of Gaddesden, the first court physician ever appointed in England, the author of "Rosa Anglica," who is referred to by Chaucer in his "Doctor of Physick," was born about the same time as the subject of this sketch. Guy refers to the work of John, but not, however, in a very complimentary manner. "Last of all arose the scentless Rose of England, in which, on its being sent to me, I hoped to find the odor of sweetness, but instead of that I only encountered the fictions of Hispanus, of Gilbert, and of Theodoric."

Mundino, or Mundinus, of Milan, was Professor of Medicine at Bologna in 1315, in which year he wrote his little treatise on anatomy. He was the earliest dissector in modern times, having dissected three human females between the years 1306 and 1315. His treatise enjoyed so great a reputation that for over two hundred years it was the authoritative text-book in all the medical schools of the Italian Universities. It was first printed in 1478, and will always be highly esteemed as an historical monument representing the state of anatomical knowledge in its infancy. Mundinus died in 1326, and though a contemporary, it is not certain that Guido ever saw him or listened to his teachings.

The general education of Guido is presumed to have been very thorough for the times in which he lived. Most assuredly, his professional education and training must have been the best possible in that age. He tells us, in his works, that he followed the course of the Faculty of Paris; that he studied at Montpellier under the great master Raimond de Molières, where he made such rapid progress that a few years later he was appointed to teach surgery in its university. Also that he attended the lectures and demonstrations at Bologna, where he not only saw, but assisted, Nicolas Bertrutius, or Bertruccio, dissect the human cadaver. Thus it is seen that Guido imbibed his learning from three of the most renowned Universities then in existence—Bologna, famous for its anatomical teachings, Paris for surgery, and Montpellier for medical science.

The condition of medicine in Europe previous to this time was low, inactive and crude. The chief sources of knowledge were the works of ancient medical writers; indeed, not all of these were yet known, being such as were not the originals but the Arabic translations, imperfect, erroneous, and more or less interpolated. The writers of that day were content with copying from those works, and making commentaries which seldom contained any original cases or observations, being confined within the narrow limits in which subserviency to authority and established methods had so long and firmly bound them.

Towards the end of the thirteenth and the beginning of the fourteenth century, previous to which medicine alone had been cultivated by the Faculty, all the translations of the early writers on medicine were gathered from Italy, and new versions of the Arabian writers were now being produced from the originals obtained from the libraries of Spain. The schools of Salernum and Bologna yielded their treasures, and finally their prestige, to that of Montpellier, which had no rival but the school of Paris. This Faculty had been aroused to the importance of surgery by Lanfranc of Milan, who had been called to Paris; it was, however, far inferior to Montpellier in the science of medicine. The latter had the books of Constantine, all the books of Gérard of Cremona, all the versions made by the order of the Emperor Frederick. Many works of Galen had been obtained from the Emperor Andronicus by Robert. Charles of Anjou had sent to the King of Tunis an embassy expressly to obtain the *Continent* of Rhazes, till then unknown in Europe. The library of Montpellier was rich in the classic literature of medicine. There were to be found all the works referred to by Bernard de Gordon, who wrote in 1303. Guy de Chauliac possessed eighteen Arabian authors, some of which are not now extant. He had the most complete collection of the surgical writings of the Middle Ages that was ever gathered together, many of which are cited only by him. At this time neither Celsus the Roman, nor Aetius the Greek, seem to have been known to any of the scholars of the West.

Having thus acquired the principles and groundwork of his profession, and stored his mind with erudition gleaned from such vast resources, he next travelled through foreign countries, the better to prepare himself for the practice of his art. He spent several years at Lyons, where he became very celebrated, and finally settled at Avignon, where, as above stated, he was patronized by the Roman Pontiffs.

From 1346 to 1348 nearly the whole world was desolated with the plague; millions of human beings died; in some places but a small percentage of the population survived. It raged with fearful malignancy at Avignon for seven months in the year 1348. Guido stood manfully at his post of duty; his unwearied zeal in a measure overcame his fears; he followed the example set by Hippocrates, long ages before, in the Isle of Cos. In his simple yet very frightful account of this epidemic, Guy says the demoralization was general. The physicians were among the first to flee; even the best surgeons did the same. Guy denounces their conduct and calls it shameful; as to himself, he feared such infamy more than the pestilence. He does not boast, but declares that he lived in constant fear of the disease with which he was at last attacked; he was laid very low for six weeks, having a continual fever, ending in an axillary bubo or abscess. His recovery was despaired of by his colleagues, yet he was finally restored to health.

The Pontiff Clement VI. rewarded him munificently for his service, and Innocent VI., his successor, also appointed him his physician, and treated him with distinguished consideration.

He was still in Avignon in 1360, in which year the plague returned. In 1363 he wrote his "Grande Chirurgie," after which his personality is lost sight of, and even the place and time of his death, and the spot where his remains were resolved to earth, are alike unknown.

As Mundinus was the restorer of anatomy in the fourteenth century, so Guido was that of surgery at the same period. Previous to his time it was a miserable art, practiced chiefly by men of gross ignorance, being the acknowledged perquisite of barbers and itinerant quacks. Guy was the first to reduce the art of surgery to a system, and to manifest a spirit of independent criticism. He composed his "*Inventarium, sive Collectorium Artis Chirurgicalis Medicinæ,*" in the year 1363. He was then ripe in years, possessed of immense erudition, of ample experience, of mature judgment, of nobility of mind, and of singular purity of principles. Of the latter, we have the proof in the following extract from the introductory chapter of his work:

> "The surgeon should be learned, skilled, ingenious, and of good morals. Be bold in things sure, cautious in dangers; avoid evil cures and practices. Be gracious to the sick, obliging to one's colleagues, wise in his predictions. Be chaste, sober, pitiful and merciful; not covetous nor extortionate of money, but let the recompense be moderate according to the work, the means of the sick, the character of the issue or event, and its dignity."

Malgaigne, to whose introduction to his edition of the works of Paré I am much indebted, exclaims: "Never, since Hippocrates, has medicine heard language filled with so much nobility, and so full of matter in so few words."

Guido's surgery was the acknowledged authority in Europe for not less than two centuries. Fallopius compares him to Hippocrates, being the first since his time to give principles to this art. Guido quotes numerous authors, upon whom he makes critical observations and judicious animadversions. Indeed, his work contains an excellent historical sketch of surgery down to his own epoch. He starts out with the sound doctrine that a knowledge of anatomy is essential to both the physician and surgeon; that without it they only grope in darkness. His surgery, accordingly, is commenced with a brief anatomical treatise—first, treating "on the common parts, universal and simple;" the second, "on the nature of the special parts, individual and compound." He sees but seven pairs of cranial nerves, and counts thirty spinal nerves, two hundred and forty bones, without the hyoid and sesamoids. He describes three ventricles in the brain, to each of which he assigns special functions. In my copy of "Guido, his Questionaries of Chirurgerie," Geo. Baker's edition, London, 1579, I find the following:

> "Question. How many celles hath the brayne after his length, and how many parts in each ventricle, and how many and what vertues taketh their origine in each parte?
>
> "Answere. First, the braine in length hath three ventricles, that is to say, the ventricle afore, that behinde, and that in the middes, and the anteriour and meane, each is devided in two parts. In each part one vertue taketh his origine. In the first part of the ventricle before is put the common bloode. In the second, the vertue of imagination. In the middle ventricle is put the cogitative and rationall. And in the hinder ventricle is put the vertue reservative or memorative."

The spirits were presumed to pass from one ventricle to the other through the *iters* of communication. He says the optic nerves are united but do not cross each other.

In making incisions for inflammation or abscesses he laid down the maxim to cut in the direction of the muscular fibres. He showed much wisdom in the classification of wounds and their treatment. His remarks on wounds of the head are very practical. "If they are well treated they will be healed; thus I have seen the posterior part of the brain, from which a little of its substance had issued; this was followed by damage to the memory, which he regained after his recovery." "Of the liver I have seen small wounds heal, but they were not deep nor with loss of any substance, as Galen testifies."

Guido practiced most of the operations which are done to-day. In cases of collections of pus in the chest he did not hesitate to let it out. His superior anatomical knowledge here served him and led him to modify the methods of his predecessors. He took exception to the counsel of Guillaume to make the incision between the fifth and fourth rib, and says:

> "Inasmuch as the diaphragm is reflected where it touches the spine and ribs, even as high as the third rib and higher, and this reflection might hinder the escape of matter, and make the operator believe that he had not made his incision deep enough, it is better that it be done between the third and fourth ribs."

He treats of hernia in detail, lays down rules and precepts for the diagnosis, prognosis and treatment. In strangulated hernia he resorted to bleeding, the taxis, in extreme cases to incisions, the cautery or to caustics. The parts were supported by the use of the truss. He resorted to one method to strengthen the relaxed parts, which was more ingenious than practical. The patient was to take a scruple of iron-filings with urine, then a large magnet was applied to the seat of the rupture, by which it was presumed that the particles of iron were attracted to the part and thus increased its tone. This remedy had been imparted to him as a great secret. The radical cure of hernia involved the destruction of the testicle, either by ligature, the actual cautery, or by caustics. The latter he preferred, as he had seen it used successfully by his master, Petrus de Bonanto, in no less than thirty cases.

He treated fistula-in-ano by much the same means now employed—viz.: by passing several threads from without inward by a flexible needle, which he brought out through the anus, and divided everything included in the loop. He operated for cataract by depression. John of Luxemburg, King of Bavaria, being blind with cataract, took occasion when at Avignon with the King of France, towards the end of 1336, to consult Guido, who wrote out for the Bavarian king a treatise on regimen which he was to follow, but for some reason declined to operate upon his august majesty. John remained blind, and was so still in 1346, at the fatal day of Crécy, where, being determined to engage in battle, his squires tied his bridle reins to theirs, and then, with sword in hand, the heroic old man rushed into the thickest of the fight, where he met the same sad fate that befell so many valiant knights who, on that memorable twenty-sixth day of August, fell before the sturdy English yeomanry of Edward III.

Guido revived the use of the trephine. He is the earliest surgical writer who speaks of the Cæsarean operation, which he advised to be resorted to only after the death of the mother in order to save the infant.

Portal (Hist. de l'anat. et de l'chirurg., v. 1.), from whom I have obtained much assistance in the preparation of this sketch, says: "Finally, it may be averred that Guy de Chauliac had said nearly everything which modern surgeons say, and that his work is of infinite price, but, unfortunately, too little read, too little pondered. He described many instruments, among others a forceps for the ligation of arteries." Hence it is seen that ages before Paré was born this practice had been adopted.

Is it time wasted to take a retrospective view of the progress of our art?

The works of Guy de Chauliac have appeared in many forms and in numerous editions. They have been abridged, commented upon and translated into nearly all the languages of Europe, and yet at this time a copy of almost any edition is rarely to be found in any of the antiquarian book stalls of Europe. The writer prides himself on the possession of a fine copy of the folio edition, from the text of 1363, *apud Octavius Scotum*, *Venetiis*, 1498, which is the earliest edition referred to by Haller. In the same volume are also published the works of Brunus, Theodoric, Roger, Roland, Bertapalia and Lanfranc. Also in the possession of a copy of George Baker's corrected English edition of "Guido's Questionaries of Chyrurgerie," small quarto, London, 1579. Guido's surgery was published at London, in folio, 1541, of which Baker says:

> "I have taken some paines in an olde booke beeing brought to me by the Printer, called Guido's Questions, desiring me to have it corrected. In the which Coppy I founde Imprinted, ill-distinct, and in many places whole lines left out, so that I could not make a perfect worke except it had bene new made, and the olde phrase altered, the which I durst not do; for beeing before imprinted, many have the booke, and woulde thinke it a great presumption in me to alter it so much as it had neede off, and especially being of so excellent a Doctor's making as Guido was. Therefore I shall desire all those that shall see it, not to condemne me, though you shall read some evil phrases in it. For I am sure it is amended in a thousand places." * * *

To this edition Baker has inserted "A prayer necessary to be sayde of all Chirurgiens."

Hamilton says a copy of the English edition of 1541 yet remains in the British Museum.

Chirurgiæ tractatus septem, cum Antidotaris, Venetiis 1490, fol.; 1498, fol.; 1500, fol.; 1506, fol.; 1518, 4°; 1519, fol.; 1546, fol.; 1559, 8°; 1572, 8°. In Spanish, Valence 1596, fol.; Lugduni 1559, 4°; Lyon 1518, 4°; 1547, 8°; 1559, 8°; 1569, 8°; 1572, 8°; 1579, 8°; 1585, 4°; 1592, 8°. *La grande chirurgie,* Rouen 1615, 8°; 1659, 8°; Bordeaux 1663, 1672, 1683, all 8°; Paris 1539, fol.; 1543, fol.; 1643; Franckfort 1574, fol.; London 1541, fol.; 1579, 4°. *Le guidon de la practique de chirurgie pour les barbiers & chirurgiens par Gui de Chauliac,* Lion 1485, 4°; Paris 1571, 16°. *Le guidon en François de Maitre Jean Falcon,* Paris 1484; Lion 1520, 4°; 1559, 4°; 1649, 8°. *Dictionarium vocum Guidonis, Isaacus Joubert Laurentii,* Veneta 1491, fol.; 1537, fol. *Laurentii Joubert annotationes sur la chirurgie de Gui de Chauliac,* Lion 1659, 8°. *Le chirurgien methodique,* Lion 1597, 12°. *Fleurs de Guidon augmentées de la practique de chirurgie & de plusieurs expériences par Meissonier,* Lion 1673, 12°; 1693, 12°. *J. Raoul fleurs du grand Guidon,* Paris, 16°; Rouen 1676, 12°. *J. B. Verduc le maitre en chirurgie, ou l'abrégé de la chirurgie de Gui de C.,* Paris 1708, 8°; 1716, 8°. *Introduction de la chirurgie par Jaques de Marque,* Lion 1580, 8°; Italice 1596, 8°.

EDITORIAL DEPARTMENT.

WHAT? WHAT FOR?

In neglected fields the weeds choke out the crops. Medical literature in this country is, to all appearances, a neglected field. Writers who should not write—at least not yet—crop out everywhere; and men whose words would be of value write nothing, or write only to be obscured by the weedy exuberance of their surroundings. And it grieves us to avow that the unfaithful husbandmen seem to be the medical editors. Brethren of the scissors and stylograph! this perennial harvest of snap-dragon and wild carrots is ours. A little industry, a little fidelity on our part, would lead to a more creditable rotation of crops. Which of us is in a position to tell the plain truth about the next book that may unfold its cotyledons to the sunlight in our vicinity? Which of us is prepared to clip and prune, with ruthless fidelity, the matter which seeks publicity in the columns under our immediate control? Which of us fairly realizes that the maintenance of a high-toned journal is the best of all baits to catch high-toned contributors withal? Which of us has the courage to inscribe at the head of his journal the motto: BLANK PAGES IF IT MUST BE SO; PADDING NEVER!

Let us examine for a moment the *raison d'être* of medical literature. What should be written? and with what object? Scientific publication has two distinct, legitimate objects: the recording of facts and the elucidation of principles. The two objects may be attained separately, or in varying degrees of combination; hence the variety of forms which legitimate medical writing may assume. A survey of our current medical outgivings would show, however, that a service might be performed if each college were to introduce a professorship of medical literature into its curriculum. At present the young physician whose mind has been debauched by a course of promiscuous medical reading finds himself ill at ease when, for the first time, he takes his pen in hand to inform the medical public that he is well, and hopes, etc. His embarrassment is to be accounted for by the fact that he is not accustomed to seeing the laws which govern scientific composition elucidated or exemplified.

And yet the whole matter is quite simple. Medical writings may be classified as

Notes,
Reports of cases,
Monographs,
Treatises,
Memoirs,
Doctrinal Essays,
Text-books,
History,
Criticism.

When a medical man discovers that he is full of a subject and must share it with his fellow mortals, he should first of all decide upon the form in which it shall see the light. Various considerations will determine this, such as the importance of the subject, the channel of publication, the class of minds to be reached, the qualifications of the writer, etc.

The simple "Note" is a favorite with strictly scientific workers. It is well adapted to the announcement of single discoveries or observations. It may be as brief as the writer can make it, and when brief and clear it is sure to be read. For the convenience of future writers, Notes should be printed in the special journals to which their subjects are germain. A note on Quercus alba should not be sent to the ANNALS, and a note on the astragalus should not be sent anywhere else. The humblest student is free to keep his eyes open for facts and principles, and "when found, make a note of."

Memoirs play a more ambitious rôle. In style they should be as chaste and severe as the simple note. But their concern is always with important subjects; they are usually based upon an extended series of studies, experiments, or observations, and they should never be sent hastily to press. Memoirs, too, should reach the public through such periodicals as will render them easy of access to the systematic student.

Reports of cases should be clear, exact and methodical, should give the whole truth, negative as well as positive, and should not be made the pretext for any outside discussion.

Doctrinal essays may be argumentative, controversial, or purely speculative. Excepting such as come from the master intellects, they are without value, and should be strangled as fast as they appear.

Monographs are to be received with caution. For one like "Peaslee on Ovarian Tumors," there will come a dozen like "Smith on Carunculæ Myrtiformes." There is no safer and cheaper road to quackish notoriety than is to be found in the publication, with good type, paper, and binding, of a monograph which nobody will read and everybody will look upon with awe.

Text-books are worth the paper only when they come from a skillful writer who has the knack of making a book and leaving himself out of it. They should contain nothing but what is demonstrated fact and accepted doctrine.

Extended treatises and historical writings should be written exclusively by men of the highest intellectual rank; and among such writers, each is a law unto himself.

Criticism is the surgery of literature. It should be conservative, yet radical. It should cut and probe absolutely without sentiment. It should be above the suspicion of side motives. For a judge to try a case in which he is personally interested is not more indecent than for a critic to review the work of his personal friend or his personal enemy. And for him to review a book in the interest of his friend the publisher is to find a depth yet lower.

The ANNALS tenders a cordial invitation to all who care to appear in its pages; but it has no place for him who does not know what he wishes to write, what for, nor when to stop.

THE CLINIC.

1. STRANGULATED HERNIA. FIGUEIRA. Operation. Recovery. J. R., æt. 35. Suffered from direct inguinal hernia for four years. Hernia strangulated with usual symptoms for three days prior to operation. Taxis and inversion of body under ether failed. Herniotomy at end of third day; sac opened; protrusion consisted of one knuckle of intestine and large mass of omentum; constriction divided several times, and hernia finally reduced after considerable manipulation. Recovery complete and rapid, with no untoward symptoms. Patient resumed work in fourth week.

2. COMPOUND COMMINUTED FRACTURE OF SKULL. HUNT. Trephining. Recovery. A. H., aged 18. Injury caused by a falling bar of iron, producing compound comminuted fracture of posterior superior angle of left parietal bone, extending into sagittal and lambdoid sutures. Hæmorrhage profuse. Insensibility for a short time immediately after accident. No signs of compression. Patient walked a distance of about four blocks. Dr. Hunt enlarged external opening and found circular depression about 3 cm. in diameter, depressed about 2 mm. below external table; attempt to raise fragments failing, with assistance of Dr. G. A. Evans trephined beyond depressed area and in sound bone; fracture of internal table extended beyond limits of fracture of external table; inner table, owing to its instability, could not be cut through with trephine, fragments yielding before instrument; operation finished with rongeur; twelve fragments of bone removed; depressed portions restored to proper level. No anæsthetic used. Symptoms of cerebral irritation, incessant talking, and repetition of same question. Wound dressed with antiseptic marine lint, and washed out freqûently with carbolized water. Ice-bag constantly to head for first week. Drainage tube inserted at end of eight days, and secured by hare-lip pins, holding also edges of flap. Slight rise of temperature and change of pupils on two or three occasions; always subsided on clearing obstructions in drainage tube. Scalp wound healed by granulation.

3. GREEN STICK FRACTURE, WITH SEPARATION OF EPIPHYSIS OF HUMERUS. WIGHT. J. H., 8 years. Fell from cart, June 23, 1880, fracturing both bones of forearm, about 2 cm. above wrist joint. Displacement angle of about °45. Reduction by forcible manipulation. No crepitus elicited. Separation of lower epiphysis of humerus with extensive extravasation around elbow joint. Treated with double-angled splint; early and frequent passive motion of both joints begun on third day. Result, wrist motions almost perfect. Elbow still somewhat impaired from excessive deposit of callus. Good union.

4. COMPOUND DISLOCATION OF GREAT TOE. WIGHT. Resection. Laborer. P. L., 40. Injured by bar of iron falling on toe of left foot, producing compound dislocation. Head of prox. phalanx projecting into space between toes. Reduction impossible; wound enlarged; toe turned out and end of bone removed with cutting pliers. Reduction then easily accomplished. Wound dressed with wire-cloth splint and carbolized oakum. Recovering rapidly.

5. STRANGULATED HERNIA. FIGUEIRA. Operation. Death. Mrs. B., æt. 69. Suffered with femoral hernia for number of years; seen on third day after strangulation; usual symptoms. Herniotomy on night of third day; reduction easily effected without opening sac; constriction external to latter. Patient died on fourth day after operation, with moderate degree of peritonitis. No autopsy allowed. Suspected gangrenous intestine.

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Lecture.

STUDIES OF THE RELATIONS EXISTING BETWEEN THE ORGANS OF REPRODUCTION AND THE BRAIN AND NERVOUS SYSTEM IN WOMEN.*

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IN discussing the relations of the sexual organs to the general organization, especially the nervous system, my endeavor will be to establish a scientific basis for future investigation rather than to exhaust the subject. As I proceed, it may be necessary to refer to the two sexes of the human species, but I shall carefully refrain from any comparison of their relative merits. Time and space enough have been occupied in our medical literature on that subject—the object apparently being to sustain certain theories rather than to get at the truth of things. The discussion of this subject has been mainly carried on between those who believe that the mental capabilities of the two sexes of the human species are equal and those who believe the reverse. The chief question at issue among the disputants is the proper spheres which men and women should respectively occupy at this stage of civilization. The facts undoubtedly are that the sphere of man is different from that of woman; they cannot both occupy the same position nor change places without detracting from the value of both. Consequently, man is superior in his natural position and woman is superior in hers, while both may be made inferior by transposing them.

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* Delivered before the Society, October 4th, 1880,

My respect for the scientific knowledge possessed by my hearers is too great to permit me to offer them information regarding the anatomy and physiology of the organs which together constitute the human body; but a brief reference to the grouping of organs and classification of systems by anatomists may be pardoned if it will help in the elucidation of their correlation. This interdependence and correlation of the several systems of the human body is a study which differs very decidedly from a knowledge of special parts. It more closely resembles the knowledge of our relations to our environments and their influence upon us. The anatomy and physiology of the brain and the uterus may be clearly understood, and still their relations to each other remain profound mysteries. Hence a special education is required in this branch of medicine, and my present purpose is to call attention to some of my studies in this department. As a matter of convenience for the present purpose, I shall treat the entire organization as grouped under three heads: using the terms, *General system*, to indicate all that pertains to nutrition and is absolutely essential to it; the *Nervous system*, to include the cerebro-spinal and organic nerves; and the *Sexual system*, to indicate all the organs devoted exclusively to reproduction. A somewhat arbitrary arrangement might be more convenient—*i. e.*, to call the reproductive organs and the cerebro-spinal portion of the nervous system special systems, and the nutritive system and the organic nerves the general system. In the human species we should then have for our consideration the nutritive and sexual systems, and the cerebrum or higher brain development.

The nutritive system, which constitutes by far the largest portion of the organization, includes all that is requisite and necessary for the maintenance of the individual; it is self-sustaining and capable of an independent existence. The reproductive system, on the other hand, is, like the cerebrum, dependent upon the nutritive system for support, and is incapable of a separate existence. It derives its organic innervation and blood supply from the general system, and is therefore liable to modifications by all variations of the nutritive system. This connection of the two systems through the nervous and vascular supply renders it possible for the reproductive system to influence the general system for good or evil, and the cerebrum from a like connection with the other two systems is capable of affecting both.

The fact of the relationship of the cerebrum to the other systems is marked, but limited from the fact that the nutritive and reproductive systems can both exist independently of the cerebrum. This fact is illustrated in plants in which the processes of development, maintenance and reproduction are performed upon the same principles as among animals, although they are destitute of the higher brain and nervous organization. The absence of the brain in plants simplifies the processes of nutrition and reproduction in that class of organisms, while the presence of the brain in animals, especially in man, complicates these processes because of the multiplicity of functions and the greater variety of correlated influences existing between the several systems.

This brief reference to the anatomical relations of the sexual organs to the rest of the body will suffice for our present purpose; hence further elaboration of this point need not be attempted. It is necessary, however, to notice the relative importance of the sexual system in the two sexes of the human species. For a full discussion of this portion of the subject I refer you to "The Physiological Reason Why," a prize essay by my friend Dr. Alexander Hutchins.

It is clearly shown by Dr. Hutchins that woman in her reproductive system is the highest type of the species. This fact being determined, it follows in the physiological order of things that a large share of her nerve force must be diverted to that portion of her organization. Certain facts regarding the size and conformation of the female brain appear to confirm this view of the subject. From a large number of observations made it has been demonstrated that the brain of woman is smaller than that of man, but compared to the size of her body it is relatively larger than in man. The following comparisons will show this more clearly:

The length of the head of woman in proportion to the length of her body is as 1 to 7.2, and in man it is as 1 to 7.4. The medium height of man is to the height of woman as 1000 to 937. The weight of man's brain compared to that of woman is as 1000 to 914. The relative weight of the two main divisions of the brain is as follows: The average weight of the cerebrum in man is 1155 grammes and in woman 1055. The weight of the cerebellum in man is 179 grammes and in woman it is 147. These figures show that, while the brain of woman is absolutely smaller than that of man, it is relatively larger; and, also, that the cerebellum in woman is larger in proportion to the size of the cerebrum than it is in man.

From this I infer that the relatively larger size of the brain in woman, especially the cerebellum, is intended to meet the demands of her highly-organized and complex reproductive organs. This conclusion is sustained by the fact that her osseous and muscular structures are smaller, and, hence, make less demands upon the nervous system than in man. Again, the history of woman's intellectual work in the past shows at least nothing superior to that of man's, but her share in the process of reproduction has been greater than that accomplished by man.

Believing as I do that brain matter is developed to meet the demands arising from the duties devolving upon organized beings, I can see no other reason for the relatively superior size of the female brain than the demands arising from the peculiarities of her sex.

I will now consider the influence of the sexual organs upon the general development of woman. The presence of the sexual organs in the organization is essential, I affirm, to the complete development and highest general functional activity of woman. The influence of the reproductive system in guiding the development of the individual towards certain attainments peculiar to the race doubtless begins during embryonic life. Germs which appear to us exactly alike differ in organization sufficiently to produce a great variety of living beings, although they may be evolved under circumstances which appear to be similar. This indicates that the products of development are determined by the nature of the germ, and not altogether by the circumstances or conditions of its development. From this we infer that the tendency inherent in the germ produces the sex of the individual of a given species according to pre-existing design. During girlhood the characteristics of the female sex are gradually evolved under the influence of the sexual organs. This is assumed upon the negative evidence obtained from the fact that there is nothing, that we know of, in the structure and functions of the general system of the two divisions of the species to produce the differentiating characteristics of sex. The mental peculiarities of sex, although not marked, appear in early life, while the sexual organs are still imperfectly developed and functionally inactive. It is towards puberty when the general system approaches its complete growth and the sexual organs are undergoing secondary development that their influence is exercised in the highest degree. In fact, the reciprocal effects of the two systems upon each other are quite apparent at that time. If a girl at puberty is defective in her general structure, the sexual organs often fail to be perfectly formed; and even when the general system is well developed, if the sexual organs are defective, the whole organization is modified. A number of cases might be cited to illustrate this point; it will suffice, however, to say that when the sexual organs, especially the ovaries, are congenitally absent, the subject will fail to develop the attributes and general appearances of the female sex. In such cases the tendency is towards the masculine type of the species.

Virchow states that all the specific properties of woman's body and mind, all her nutritive and nervous sensibilities, the delicacy and roundness of her figure, and, in fact, all her womanly characteristics, depend upon her ovaries. This expresses the opinion of the majority of competent observers who refer to the subject; and I can see no other way by which such results could be obtained except through influences exerted during development.

It is certainly extremely rare to see a normal symmetrical general system in connection with defective reproductive organs. Hence, it is difficult to tell how far the sexual organs act in the causation of abnormal phases of the general organization. In the few cases which I have carefully observed, in which the general organization appeared to be faultless, while the sexual organs were undersized and the menses irregular and scanty, the general functional activity was below the highest standard of health. In one class there was a marked sluggishness, both mental and physical, with a strong tendency to obesity; in the other there was premature degeneration; the evidences of old age occurring early in life. The menses were scanty and irregular, and ceased entirely in one case at twenty-eight years; in another at thirty-one. Both of these women had subsequently phthisis pulmonalis.

In the present state of our knowledge it is impossible to state positively to what extent general ill-health may be caused by the malformation and imperfect functional action of the sexual organs. My own impression is that the general health is often markedly impaired by lesions of formation and the consequent deranged function of the reproductive system. This belief is based upon clinical observation in connection with the well-known fact that any considerable imperfection of any part of the organization relating directly or indirectly to the nutritive system modifies the whole structure, and that modification is in the direction of a lowered vitality. Were this not so, we would expect that if the sexual organs (which claim a considerable share of the nutritive forces) were small and their functions reduced to the minimum, the general system would be capable of extraordinary attainments in development, growth and functional activity; but such we know is not the case. There is a general law of compensation between organs engaged in similar functions, so that impaired action on the part of one may lead to hypertrophy and increased functional activity of the other. It is upon the strength of this law that we urge the skin and alimentary canal to eliminate urea when the function of the kidneys is suspended. There is, however, no such disposition to mutual aid on the part of the several systems, with two exceptions—viz., vicarious menstruation and extra uterine pregnancy.

Viewing the subject from another standpoint, we see that the girl who begins to menstruate and bear children prematurely suffers from early arrest of general development. Races and individuals who procreate early in life seldom attain the highest possible development of the general system. This sufficiently shows that the harmony of relations between the nutritive and sexual systems may be disturbed in varying degrees by premature development of the one which retards the other. Retardation of one system may also affect the rest of the body; at least, we know that retarded development of the sexual organs does not always favor a higher growth of the general system, as we might naturally suppose it would. Before the sexual organs enter upon functional life, their influence is limited to the production of certain characteristics of the individual. After puberty they are capable of deranging nutrition and modifying the functions of the brain and nervous system.

The effect of imperfect sexual organs upon the brain and nervous system is perhaps greater than upon the nutritive system. The sexual appetence exerts a marked influence upon the development of the brain and nervous system, and also upon their functions, by exciting the exercise of the intellectual faculties and the emotions in a variety of ways. Many of the manifestations of the mind are but responses to extrinsic impressions and physical wants. During early life—the "receptive age," as Dugald Stewart called it—the brain is called into action by surrounding objects and whatever there is outside of itself that can affect it; therefore mental development depends largely upon the impressions made upon it. By withholding the influence of the sexual organs, a modified mental condition is the sure consequence, and that modification is towards a lower organization. The facts obtained by clinical observation support this doctrine. Among the insane I have found a number of young patients in whom the sexual organs were imperfect and inactive, and the brain was correspondingly defective. They were normal as children, but they remained childish. The arrest of brain development apparently took place at puberty, and deranged function in the form of insanity followed soon after.

It has been claimed upon theoretical grounds that the sexual organs complete their development and take up their function when the osseous and muscular systems stop or begin to subside in development, and the excess of nutritive force, accumulated by the lessening demands of the bones and muscles, is directed to the reproductive system. This theory is based upon the fact that the termination of development of the osseous and muscular structures occurs at the time when the functions of the sexual organs begin. Furthermore, the development of the bones and muscles stops at an earlier period of life in woman than in man; so that she continues to be inferior to man in the size and strength of her osseous and muscular structures. This gives her what is called a supplemental nutritive power, which sustains her sexual organs. It is also claimed by Dr. Mary Putnam Jacobi, in her book entitled "The Question of Rest for Woman," that the motor power required to control the muscular system is less in woman than in man; hence the greater development of the cerebrum in man is necessary to control his muscular system. It follows, therefore, that the sexual organs make no extra tax upon the brain power, but are abundantly supplied by the nutritive forces rejected by the muscular system. I am inclined to give weight to this view of the relations of the muscular and sexual systems, but I do not think that the whole truth is contained in that one fact. It appears reasonable to suppose that the nutritive system and the nervous system are all more or less taxed by the sexual organs in the performance of their functions. It may be true that during the process of menstruation there may be no more urea eliminated by the kidneys; the circulation may not be changed, except a slight increase of vascular tension for a short time before the menstrual flow, and the majority of women may manifest all the activity of body and mind during menstruation that they do at other times; but it does not follow that ovulation and the nutritive changes of the mucous membrane of the uterus that are constantly going on are all sustained by the nutritive materials left over after supplying the bones and muscles. I grant that woman may not, in her highest integrity, require special rest during her menstrual period, but I firmly believe that ovulation, development, degeneration and exfoliation of the mucous membrane of the uterus, which take place every month, impose a tax upon her whole organization. A normal tax it is, and one that does not impose ill health, but subtracts something from the vital power of all her organization, although it may be but little. Were it the muscular system alone that is influenced in its nutrition by the sexual organs, then extreme muscular labor would influence the sexual functions more than excessive brain work. The contrary of this has been noticed in practical observations.

The functions of the sexual organs are established early in the life of woman, and are necessary to the welfare of her whole organization. They are involuntary, not subject, to the will of their possessor. In the male the sexual function may voluntarily be postponed for an indefinite time without injury to the brain or general system. This last statement is made upon the authority of Dr. Elizabeth Blackwell, who clearly discusses that subject in her very excellent book—" Moral Education in Relation to Sex."

One thing is certain regarding ovulation and menstruation —viz.: These functions must, when once established, continue, or else the whole organization, including the brain, will suffer derangement. Again, a certain degree of health of the general system and brain is requisite to a normal ovulation and menstruation. This interdependence, which any one can verify by clinical observation, argues strongly in favor of the influence of the sexual organs being general, not special and limited. Leaving the theoretical and turning to that which can be seen in every-day practice, we can trace the influences of the various systems upon each other in diseased states, and reason from the abnormal to the normal. It is well known that excessive menstruation impairs general nutrition, and indirectly diminishes mental vigor. The same results follow suppression of the menses from unnatural causes. Amenorrhœa, caused in a healthy woman by nervous shock or exposure to cold, will derange her general nutrition. Secretion and excretion are retarded, and mental inactivity follows. This influence of the sexual organs is chiefly exerted through the organic nervous system, no doubt. The nervous phenomena which are manifested by such subjects, are not always accounted for by the extent of deranged nutrition present; therefore it may be inferred that the effect of deranged menstruation upon the organic nervous system is to lower its vital activity. The cold hands and feet, the irregular flushing of the face, the constipation and flatulence which occur in that class of cases are relieved most certainly by remedies which stimulate the organic nerves, showing that they at are fault.

The relation of pregnancy to the general organization has been more carefully investigated than any other portion of the subject under discussion, and need not, therefore, occupy much of the present time. The great modifications in the general nutrition which take place during utero-gestation, as shown by the changes in the composition of the blood and dynamic state of the circulation, the enlargement of the glands generally and their increased functional activity, the extraordinary activity of the lymphatics, and the changes in color of portions of the skin, are all familiar to every observer. I venture to make the assertion that these changes are all produced primarily through the influence of the gravid uterus upon the nervous system. That the nervous systems, organic and cerebro-spinal, are influenced by the pregnant state, is true in a marked degree. The gastric derangement, the abnormal cravings for peculiar articles of food, mental depression and irritability, the extreme nervous tension which predisposes to eclampsia and puerperal mania, all testify to the fact that the sexual organs in the performance of their functions influence the nervous system to an extent that is unequaled by any of the organs of the rest of the organization. The phenomena which appear during pregnancy suggest that the body and mind are made tributary to that one function. All the mental and physical phenomena of pregnancy, although normal, hold a kind of intermediate position between the normal and pathological influence of the sexual organs on the brain and nervous system.

In studying this part of the subject, we observe an excitation of the nervous system (due to modified nutrition), at first normal, but tending to and often eventuating in marked disorders of nerve function.

In diseases of the nervous system we often suspect the sexual organs of being the cause without being able to prove it, but in pregnancy we have evidences of the relationship of cause and effect which are beyond question.

With this knowledge of the profound effects produced upon the brain and nervous system by the process of reproduction we anticipate more marked influences in disease of these organs. The functional importance of any organ renders it more varied and extensive in its effects upon the organization in health and disease, and the complexity of anatomy and physiology of any structure increases its liability to disease. This is well illustrated in the accidents and diseases incident to reproduction. The derangement of menstruation from natural causes, the injuries so frequently sustained in parturition, and the great variety of inflammatory affections which are liable to follow them have no parallel in any other organized being than woman. And, because of all this, her brain and nervous system are taxed by the normal action of the procreating organs and deranged by diseases of them. Lactation, also, makes great demands upon the nervous system. The evidence of this is found in the great number of nursing women who suffer from nervous exhaustion, or neurasthenia, as it is now called. In this condition there is not only a lowered state of the general nutrition and anæmia, but also a well-defined depression of the nervous system which in some cases terminates in insanity. It is true that this nervous exhaustion is due generally to the fact that women, either from choice or necessity, engage in severe mental and physical labor while nourishing their offspring, but that does not modify the fact regarding the taxation of lactation.

Thus far I have considered the correlation of the sexual and nervous systems as maintained chiefly through the nutritive system. There remains still the most obscure portion of this subject—viz.: The relation of the sexual system to the brain, or, to use more popular phraseology, the correlations of these portions of the body and the mind. To a certain extent reproduction is an involuntary process. Nevertheless, the appetence which directs the human species to seek those social relations through which reproduction is consummated has its origin in the mind as surely as the poet's love of the beautiful or the physician's interest in science. The will power and reason can aid in the fulfilment of the reproductive function, guide and restrain it, or prevent its completion. To this extent the mind controls reproduction, and the efforts to do so engage the brain functions to an extent greater, perhaps, than any other object in life. The natural gratification of the sexual appetence, under the control of the reasoning power, gives intellectcal enjoyment by securing new objects of admiration, and by stimulating the brain to higher exertions in order to obtain protection for the object admired. Of all the inducements to brain work, this is the highest, not even excluding ambition and avarice, and the fulfilment of the injunction "to multiply" is the highest earthly enjoyment of woman. On the other hand, failure in reproduction in all that belongs to that process, whether voluntary or by force of circumstances, always causes more or less disappointment and mental depression in those who are naturally of sound mind and body.

The brain is capable of overdoing attention to the sexual system; and by stimulating and perverting the normal emotions and overtaxing that portion of the organism, disease and debility are engendered. Perverted mental influence in this direction is likely to result in derangement to some extent of the brain itself by reaction from disease of the sexual organs.

Clinical observation affords ample proof of the truth of these statements. An ovarian or uterine hyperæmia arising from extrinsic causes first deranges the function of these organs, and, secondarily, produces perverted brain action in the form of irritability, mental depression, excessive interest or apathy. Every physician is familiar with the groundless fears, the melancholia and mental irritability which so often are associated with diseases of the sexual organs. It is equally well known that evil influences direct the mind to the sexual organs and excite them to premature, and, hence, imperfect functional action. In adult life, also, the brain, which is badly organized and unqualified by culture for its office of guarding and protecting the physical functions, may so influence the sexual organs as to make their periodical excitation and congestion continuous and abnormal.

As physicians, we ought to know that the first departure from health may be either in the brain or in the sexual system, and the chain of pathological conditions which follow, from either starting point, may be the same.

Some of the diseases and derangements of the sexual organs which react upon the mind may now be briefly referred to. But before introducing conditions observed in practice to illustrate the statements already made, it may be well to recapitulate by stating the following propositions:

The normal exercise of all the functions in the process of reproduction imposes a tax upon the whole organization, but in return strengthens and preserves body and mind by maintaining the harmony of the entire organization. Excess in any of the functions of the sexual system causes depression of the whole organization, especially of the brain and nervous systems. Arrest of any of the functions of the sexual system causes derangement of nutrition and also of the brain and nervous system. Extreme functional activity of the brain detracts from the strength of the sexual system generally by increasing excitability at the expense of power; sometimes excessive brain work causes diminished excitability and power also. Early excitation of the emotions and mental attention to the sexual system will cause premature functional action to a limited extent, the result of which is imperfect development, abnormal irritability and want of power of the sexual organs.

In illustration of the first proposition, it is well known that the best specimens of mental and physical health are those women who have menstruated normally and have borne and raised a number of children under protective and favorable circumstances. Although reproduction makes great demands upon the whole organization, the taxation is natural, and therefore strengthens and preserves the body in the same way that reasonable exercise will strengthen muscles. Cases which come under the second head are too familiar to require much notice. The pale, care-worn mother, exhausted by frequent child-bearing and prolonged lactation, whose nervous system is rebelling against over-taxation, may be seen every day. Such an one complains of many nervous symptoms; she is emotional, fearful of dangers, and cannot relate her symptoms to her physician without weeping. Her whole bearing shows plainly that she is on the boundary line of insanity. The same general condition (arising from very different causes) is to be seen in the subject of easy virtue, who, regardless of the hygiene of her sexual system, is reduced to a pale, spongy mass of sluggish, ill-nourished tissues, with a broken nervous system which is incapable of doing anything well except manifesting hysteria.

Of all the menstrual derangements, dysmenorrhœa, whether due to malformation of the uterus or disease of the ovaries, is the most marked in its effects upon the mind. The pain and suffering may be borne for some time without producing any very serious effects upon the brain and nervous system, but the ever-recurring week of extreme suffering, which makes an invalid of the patient during one-quarter of her time, soon undermines the strongest brain and nervous system.

In "Body and Mind," by Bain, the influence of pain is well defined in these words: "The light smart of a horse-whip is enough to awaken the energies without damaging the vitality. The pain of a flogging, which multiplies smarts of still greater intensity, is utterly exhausting to the whole system." So it is with the suffering of dysmenorrhœa. At first it might be supposed that the reproductive organs, being largely under the influence of the organic nerves, and to a great extent involuntary, the mind would not be capable of indirectly affecting the functions of these organs, except through the direct agency of the will. Theoretically this appears to be the state of the case, but actually it is otherwise. To show this in clear light, it is only necessary to recall the well-known facts of the effect of the emotions in arresting menstruation and utero-gestation. Cases of suppression of the menses and abortion caused by shock, fear, grief, over-joy, and suffering from pain, are so familiar as to require no comment here. The facts teach, however, that other mental states of a milder nature produce effects upon the sexual system equally important, although less abrupt and striking. Intellectual labor, too severe or prolonged, tends, no doubt, to debilitate and derange the sexual system, but not to the extent usually supposed. There are few in this world who have sufficiently overcome the natural laziness of the human race to over-indulge in pure intellectual labor. Much has been said and books have been written to prove that school-girls should not be compelled to study severely at puberty and during menstruation, but no one should be required at any time to pursue a course of study which cannot be kept up during menstruation. There should be sufficient reserve force at all times to sustain the little extra taxation of menstruation. It has always appeared to me that if school-girls were sufficiently supplied with good food and could be protected from premature emotional excitement, they would be able to obtain a liberal education and menstruate comfortably during a part of their school days. But although woman may not require special rest during menstruation, she ought to be protected from all those influences which are capable of arresting that function. She may be capable of an amount of mental and physical labor which most men would consider sufficient for themselves, but she cannot endure over-work and extreme mental excitement during her menstrual period without endangering her health from derangement of her sexual system. Physicians know, and women ought to know, that menstruation can be arrested or deranged by abnormal, mental and physical influences, and that most unfortunate results may follow therefrom. That fact alone shows that she cannot safely expose herself to the dangers of life to the extent that man may do with impunity, and hence it should teach her to guard against that possibility of self-injury. Still, excessive brain work will derange the functions of reproduction; not because of any disturbance of the relations between the brain and the sexual system which are maintained through the nervous system, but simply by derangement of nutrition. If an excess of nutritive force is directed to the brain, the sexual system will be deprived of its just dues and become lowered in the scale of health.

Society Reports.

STATED MEETING, AUGUST 16, 1880.

THE ORIGINS OF SOME OF THE ANTERIOR MUSCLES OF THE FOREARM.

J. F. WALSH, M. D.

Most anatomists state that the pronator radii teres, the flexor carpi radialis, the palmaris longus, the flexor sublimis digitorum, the flexor carpi ulnaris, and the flexor profundus digitorum arise, in part, from the deep fascia of the forearm, but none of them describe to what fixed points their origins may be traced through means of it. This fascia at the upper and inner parts of the forearm is much thicker than elsewhere, and practically constitutes a muscular aponeurosis for the muscles arising in this region. Here it is composed of four different sets of fibres (Fig. 1). One of these arises from the inner margin of the olecranon process of the ulna, and runs downward and forward; a second, from the posterior border of that bone, and runs transversely across the arm; a third, from the inner condyle of the humerus—some of these fibres run downward and forward, some directly downward, and some downward and backward; and a fourth, from the tendon of the biceps muscle (the bicipital fascia), running, in a curved line, downward and backward. Hence these muscles may be said to arise, by means of this aponeurosis, from the olecranon process of the ulna, the posterior border of the same, the inner condyle of the humerus, and the *tendon of the biceps muscle.*

As to the latter origin it will, of course, be seen that it can only be efficient when the muscle is in contraction and the tendon, thus rendered tense, becomes a fixed point. But that it is quite an important one for some of the muscles may be shown in the following manner: If, with the elbow bent, we flex the fingers lightly, it will be found that the biceps is not called into any stronger action than has been required to flex the elbow-joint, but that the moment the fingers are forcibly shut upon the palm of the hand, the muscle contracts violently, and the tendon and bicipital fascia stand out hard and tense beneath the skin. In fact, it is impossible to flex the fingers strongly without bringing this muscle into play. Now here, as long as the flexors are not called upon to perform any extra work, only some of their fibres are required to act, but as soon as strong action is needed, then every fibre must contract, and in order to give purchase to those arising from its tendon, the biceps contracts also. On the other hand, if the arm be firmly extended, and the fingers be shut with force, the tendon of the biceps can be both seen and felt to be

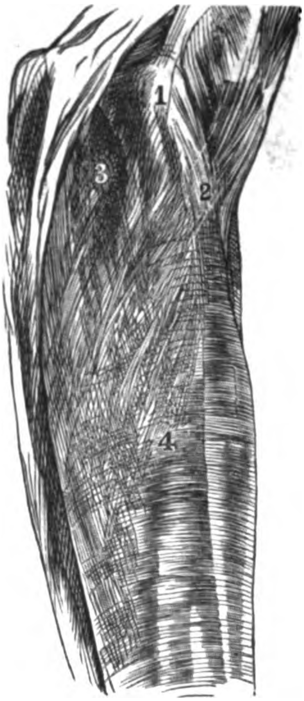

FIG. I.

THE ANTERIOR FIBRES OF THE APONEUROTIC SHEATH OF THE FOREARM.

1. Fibres arising from the inner condyle of the humerus. 2. Bicipital fascia. (The arm from which this cut was taken was not very muscular, hence this fascia is not as well developed as ordinarily.) 3. Fibres arising from the inner side of the olecranon. 4. Fibres arising from the posterior border of the ulna. (Lying deeply they cannot be well perceived through the fascia above them.)

drawn upon by the contracting flexors of the fingers. But in this position the flexion cannot be performed with as much strength as in the former, for the tendon is not as tense as when its muscle is contracted. Another example can be found in the pronator teres. If we wish to perform a strong pronation, as, for instance, in boring a hole with a gimlet, the aid of the biceps will be necessary in the same manner as in the preceding case. But it will be discovered that this muscle remains in contraction, and its tendon tense only through the description of a little over half of the arc of pronation; for the reason that, as it is a supinator as well as a flexor of the arm, the antagonistic action of pronation tends to relax it. Now, if we watch a carpenter boring a hole we will see that he instinctively performs only about one-half of the act, when he stops and commences over again; for after this, the biceps relaxing, the pronator loses its point of purchase from the tendon.

The function of the bicipital fascia is thus, I believe, to act as a medium of origin for these muscles, from the tendon of the biceps. But it has still another use. When the arm is flexed, the aponeurotic fascia under consideration necessarily becomes loose and wrinkled, and if the muscles arising from it were called into action they could not, of course, obtain any purchase from it. But the biceps contracting, it draws upon the aponeurosis through this fascia and makes it tense.

The pronator radii teres does not arise by two distinct heads. The appearance of two heads is caused by the median nerve running through the muscle and pushing the lower fibres away from the upper in its course through. But if the nerve be divided above and below, and the isolated portion drawn out from the muscle, as has been done in Fig. 2, it will be found that the tendon of origin of the lower fibres becomes continuous above with the tendon by which the upper fibres arise from the inner condyle of the humerus. In an anomalous disposition in which the median nerve ran above instead of through the pronator, there was not the least trace of two heads. Here the fibres arose from one continuous tendon having origin from the inner condyle of the humerus, the internal lateral ligament, and the coronoid process of the ulna. But even if it were admitted that the two portions constituted two distinct heads, still anatomists would be incorrect in describing, as they all do, the lower one as simply arising from the inner side of the coronoid process of the ulna, for it arises as well from the internal lateral ligament and the inner condyle of the humerus. In Fig. 3 the two so-called heads have been split apart and the upper divided so as to show the lower. It will be seen that this runs up in common with the other muscles to be inserted into the lower part of the internal condyle of the humerus. This second head has also an additional origin from the tendon of the brachialis anticus, short tendinous fibres running from the inner lower portion of the latter to join it at its origin from the coronoid process. This muscle when contracted will thus aid the biceps in giving the pronator additional purchase when strong action is required.

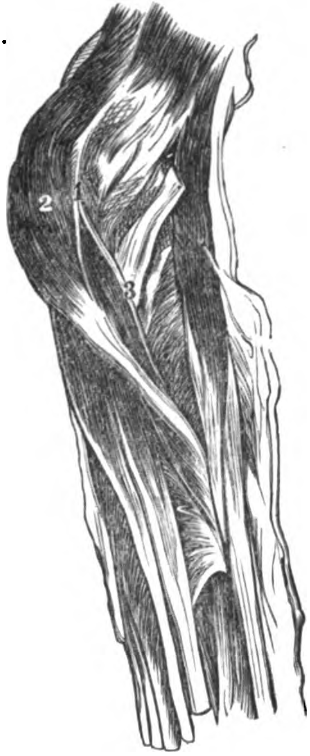

FIG. 2.

ORIGIN OF THE PRONATOR RADII TERES.

1. Fusion of tendinous origins of the lower and upper portions of the pronator radii teres. (The upper portion of the muscle has been drawn downward and outward so as to show the deeper one.) 2. Upper division; and 3. Lower division of the muscle.

The flexor sublimis digitorum, in most cases, besides arising from the oblique line of the radius, has also an origin from the greater part of its anterior border. Quain* is the only anatomist I have found mentioning this fact; he says: "It arises from the inner condyle by the common tendon, and the fibrous septa common to it and the other muscles; from the internal lateral ligament; from the anterior surface of the coronoid process at the inner side; *and by a thin, flat portion from the oblique line and part of the anterior border of the radius.*" But he does not say from how much of the border. I have found it generally extending from the oblique line to within about two inches and a half of the wrist, or for nearly two-thirds of its surface. This muscle has a fourth head which has not heretofore been described (Fig. 4). At the outer side of the base of the coronoid process of the ulna there arises a tendinous fasciculus which, after giving off the oblique ligament to the radius, with the remainder of its fibres, forms a flat and quite strong tendon. This is joined by a strip of fascia, which, on being traced upward, will be found to commingle with that covering the orbicular head of the radius and the insertion of the biceps muscle. The tendon thus formed runs beneath the pronator radii teres near its insertion, and gives origin to muscular fibres on the under and outer part of the flexor above its radial

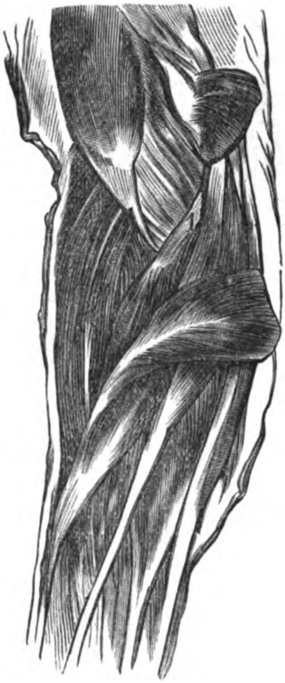

FIG. 3.
ORIGIN OF THE LOWER PORTION OF THE PRONATOR RADII TERES FROM THE INNER CONDYLE OF THE HUMERUS (1).

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* Elements of Anat. 8th ed. New York, 1877. Vol. I., p. 211.

origin. This head lies very deeply, and, in order to expose it well, the muscular mass arising from the inner condyle of the humerus must be divided near its origin, and its various tendons cut below. The mass thus isolated, on being turned over the radius, will be found to be still adherent on its outer side by the radial origin of the flexor and this head. In Fig. 3 the flexor longus pollicis received also some fibres from the head; but it is an anomalous arrangement of rare occurrence.

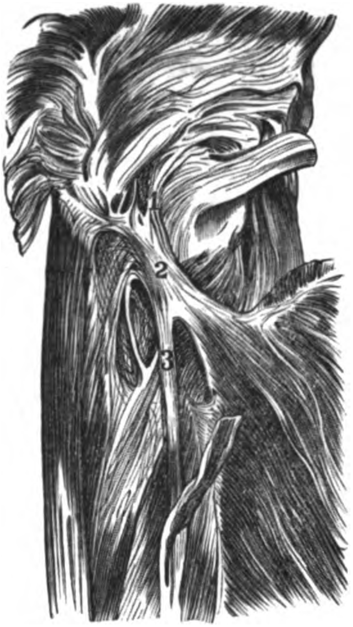

FIG. 4.

ORIGIN OF THE FLEXOR SUBLIMIS DIGITORUM.

1. Fascia from orbicular ligament and insertion of biceps to fourth head of flexor sublimis digitorum. 2. Fourth head of the flexor. 3. Anomalous head of flexor longus pollicis.

The flexor longus pollicis has an additional origin by a long, thin, fleshy head which terminates in a narrow tendon about three-fourths of an inch long from the inner condyle of the humerus (Fig. 5), in common with the outer muscles arising here. This is described as an anomaly in all recent works on anatomy which I have examined that refer to it. Gray* states that the flexor "arises occasionally by a fleshy slip from the inner side of the base of the coronoid process of the ulna;" but this is a mistake, for it never arises from this bone. Horner† is the only one I have found who describes it as normal; he says "the body of the muscle is joined by a fleshy slip from the internal condyle of the humerus." Blandin,* in a foot-note referring to this head, says that he believes that this is the usual arrangement; and it is only for sake of conformity to received opinion that he describes it as anomalous.

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*Anatomy, Descriptive and Surgical, 1861.

†Special Anatomy, 5 ed., 1840; p. 423.

The flexor profundus digitorum and the flexor longus pollicis do not arise each from the half of the interosseous ligament adjoining to the bone from which it has origin—the ulna for the former and radius for the latter—but only from narrow strips bordering on these bones (Fig. 5). The main portion of the membrane is clear, the interosseous vessels and nerve resting upon it.

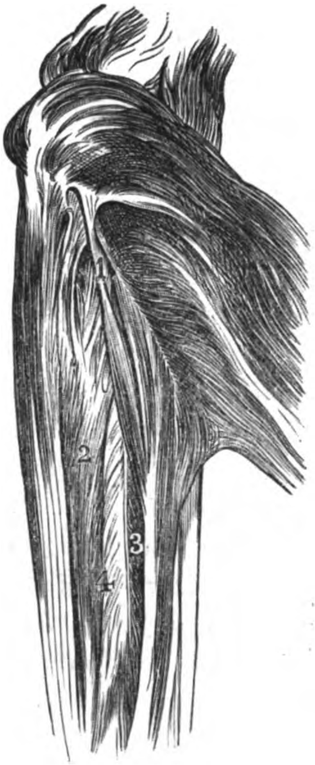

FIG. 5.

ORIGINS OF DEEP LAYER OF MUSCLES OF FOREARM.

1. Second head of flexor longus pollicis. 2. Flexor profundus digitorum. 3. Flexor longus pollicis. 4. Interosseous ligament.

The origins of the anterior muscles of the forearm are, then, as follows:

The pronator radii teres arises by fleshy fibres from the internal supra-condyloid ridge and by tendon from the inner condyle of the humerus, the internal lateral ligament, and the inner side of the coronoid process of the ulna. The median nerve running through the muscle divides it into an upper and a lower portion. The tendon of origin is split in a corresponding manner, at about the middle of the elbow-joint. One part runs into the upper division of the muscle, and is there lost in its fibres; the other proceeds downward, being attached to the internal lateral ligament, and the inner side of the coronoid process of the ulna, and gives origin to the lower division (Fig. 2). This muscle also arises, by means of the aponeurotic fascia at the upper inner portion of the forearm, from the internal condyle of the humerus, the inner border of the olecranon process of the ulna, the posterior border of this bone for its upper fourth, and the tendon of the biceps muscle; and by some filaments to its lower portion, from the tendon of the brachialis anticus.

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* Traité d'Anat. Topograph, 1826; p. 520.

The flexor carpi radialis arises from the inner condyle of the humerus, and by a few fibres from the common aponeurosis above mentioned. The palmaris longus has the same origin.

The flexor sublimis, besides having a strong origin from the common aponeurosis, has four distinct heads. One of these springs from the internal condyle of the humerus and the internal lateral ligament of the elbow-joint; a second from the inner side of the coronoid process of the ulna, just below the origin of the pronator teres; a third from the oblique line and anterior border of the radius to within about two and one-half inches above the wrist, and a *fourth* from the outer side of the base of the coronoid process of the ulna.

The flexor carpi ulnaris, at its upper portion, has two heads of origin. One of these comes from the internal condyle of the humerus, and the other from the upper part of the inner border of the olecranon. Between these two heads runs the ulnar nerve. The rest of the muscle has origin downward for about two-thirds of the extent of the forearm from the common aponeurosis. Being situated near the posterior border of the ulna, this muscle will necessarily obtain more purchase, when in action, from this bone than from the other points to which the aponeurosis is attached—viz., the internal condyle and the tendon of the biceps.

The flexor profundus digitorum arises from the inner surface of the olecranon; the inner and anterior surfaces of the ulna for about three-fourths of its extent; from a narrow strip of the interosseous membrane bordering on the bone, and by fibres on its anterior and outer surface from the common aponeurosis for about two inches of its extent above.

The flexor longus pollicis arises from the anterior surface of the radius, extending from the oblique line to the upper border of the pronator quadratus muscle, and from a strip of the interosseous ligament adjacent to the bone; and by a second, thin, fleshy head, from the internal condyle of the humerus.

The above observations were made in a dissection of thirty arms. In these the variations as to the points which I have called attention to were as follows: Once the pronator teres did arise by two heads, but the second came from the inner side of the olecranon at about its middle. It was a thin, fleshy head, arising by a narrow tendon about a half an inch long, and joined the body of the muscle, at an acute angle, near its insertion into the radius. Four times the flexor sublimis digitorum had no origin from the anterior border of the radius, but was confined to the oblique line, and in six cases it arose from a small portion only of the latter. Twice the fourth head of this muscle gave an origin to the flexor longus pollicis, as shown in Fig. 4. Five times the flexor longus pollicis had no second head coming from the internal condyle of the humerus.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

XI.—WILLIAM HARVEY.

1578—1657.

EVERY discovery in anatomy and physiology which had been made previously to the discovery of the double circulation of the blood, was comparatively insignificant. Every schoolboy knows the fact that this great discovery was made by the Englishman, Dr. William Harvey; and yet there are but few persons, even in the medical profession, who are familiar with the life of this man, or who know when and how, through a series of successive revelations, one step after another was taken, by the patient researches and genius of many master minds till the way was opened up and prepared for the final interpreter of God's marvellous, beautiful, yet simple method of performing this important function.

It is a long and delightful story when followed through all its details, of which, however, but a cursory and imper-

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fect account can be given within the narrow limits allotted to these sketches.

The pathway to the climax of this discovery was not only long but extremely rugged, hedged in by deeply-rooted errors and obscured by rank prejudices, ancient and wide-spread. The errors must be destroyed, the obscuring mists penetrated, the explorers must work slowly and cautiously, by ingenious experimentation, subtle investigation, painstaking observation, accurate description and rational interpretation of facts and phenomena. Thus it came to pass that anatomists discovered one thing after another, and little by little the light of truth dawned upon their minds, wherewith they saw and gave the world sensible ideas of parts and their uses, when, eventually, "the immortal Harvey," the crowning light, the clear-headed philosopher, the Newton of physiology, drew the simple chart of the double circulation of the blood. This important event took place two hundred and sixty odd years ago, Harvey having developed his discovery and first disclosed his views on the subject about the year 1619.

William Harvey was born three full centuries ago, of highly-respectable Kentish parents, at Folkestone, England, on the first day of April, 1578. Great men have chiefly come of superior and noble-minded mothers. The estimation in which Harvey's mother was held is expressed in the following quaint and lovely moral portrait inscribed on the monumental tablet in Folkestone church, believed to have been written by her distinguished son himself:

"A. D. 1605, Nov. 8th, died in y^{e} 50th yeere of her age, Joan,
Wife of Tho: Harvey. Mother of 7 Sones & 2 Daughters.
A Godly harmles Woman: A chaste loveing Wife;
A charitable quiet Neighbour: A cōfortable friendly Matron:
A provident diligent Huswyfe: A careful tēder-harted Mother.
Deere to her Husband; Reverensed of her Children;
Beloved of her Neighbours; Elected of God.
Whose Soule Rest in Heaven, her Body in this Grave:
To Her a Happy Advantage; to Hers an Unhappy Loss."

When he was but ten years of age Harvey was put to the grammar school of Canterbury. At sixteen (1593) he became a pensioner of Caius College, Cambridge; at nineteen he took the degree of B. A. and quitted the university. Having chosen the profession of medicine, he determined to go to Italy to pursue his medical education. Several of its schools were famous, but he was particularly attracted by the renown of the University of Padua, and the special reputation of some of its great masters, among whom at that time (1598) was Fabricius, of Aquapendente, and Julius Casserius of Placentia, the former professor of anatomy, the latter of surgery. In April, 1602, Harvey having passed four years in Padua and being twenty-four years old, received his degree of doctor of medicine, which licensed him to practice and to teach arts and medicine in every land and seat of learning. Returning to England in the first year of James I., he also received his doctor's degree from the University of Cambridge, and then settled in London. Two years later he married the daughter of Dr. Launcelot Browne, who had been physician to Queen Elizabeth. The same year he became a fellow of the Royal College of Physicians. In 1609 he was appointed physician to St. Bartholomew's Hospital, his application having been supported by the king himself, and by the president of the College. In the year 1615, at the age of thirty-seven, he was, fortunately for science, chosen reader of the anatomical and chirurgical lectures founded by Lord Lumley and Dr. Caldwell.

It is an interesting fact that Harvey commenced his first course of lectures and began to teach his views upon the circulation of the blood the same year that is also made memorable by the death of Shakespeare (1616).

Harvey made no haste to inform the world of his great discovery; he did not thirst for fame, he quietly and unostentatiously taught and demonstrated it to a select and intelligent audience for nearly a decade before he ventured to publish his modest but wonderful-like book "concerning the motion of the heart and blood in living creatures," first printed in Latin, at Frankfort-on-the-Main, in the year 1628, under the following title: "*Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus.*" It was dedicated "To the most illustrious and indomitable Prince Charles," and again "To his very dear Friend, Doctor Argent," etc., who was president of the Royal College of Physicians. In this, he says:

"I have already and repeatedly presented you, my learned friends, with my new views of the motion and function of the heart, in my anatomical lectures; but having now for nine years and more confirmed these views by multiplied demonstrations in your presence, illustrated them by arguments, and freed them from the objections of the most learned and skillful anatomists, I at length yield to the requests, I might say entreaties, of many, and here present them for general consideration in this treatise."

Harvey devotes the whole of the first chapter of his treatise to "The author's motive for writing." This is so modest and simple, and so brief withal, that I cannot forbear to quote it entire:

"When I first gave my mind to vivisections, as a means of discovering the motions and uses of the heart, and sought to discover these by actual inspection, and not from the writings of others, I found the task so truly arduous, so full of difficulties that I was almost tempted to think, with Fracastorius, that the motion of the heart was only to be comprehended by God. For I could neither rightly perceive at first when the systole and when the diastole took place, nor when and where dilatation and contraction occurred, by reason of the rapidity of the motion, which in many animals is accomplished in the twinkling of an eye, coming and going like a flash of lightning; so that the systole presented itself to me now from this point, now from that; the diastole the same; and then everything was reversed, the motions occurring, as it seemed, variously and confusedly together. My mind was therefore greatly unsettled, nor did I know what I should myself conclude, nor what believe from others; I was not surprised that Andreas Laurentius should have said that the motion of the heart was as perplexing as the flux and reflux of Euripus had appeared to Aristotle.

"At length, and by using greater diligence, having frequent recourse to vivisections, employing a variety of animals for the purpose, and collating numerous observations, I thought that I had attained to the truth, that I should extricate myself and escape from this labyrinth, and that I had discovered what I so much desired, both the motion and the use of the heart and arteries; since which time I have not hesitated to expose my views upon these subjects, not only in private to my friends, but also in public in my anatomical lectures, after the manner of the Academy of old.

"These views, as usual, pleased some more, others less; some chid and calumniated me, and laid it to me as a crime that I had dared to depart from the precepts and opinions of all anatomists; others desired further explanations of the novelties, which they said were both worthy of consideration, and might perchance be found of signal use. At length, yielding to the requests of my friends, that all might be made participators in my labors, and partly moved by the envy of others who, receiving my views with uncandid minds and understanding them indifferently, have essayed to traduce me publicly, I have been moved to commit these things to the press in order that all may be enabled to form an opinion both of me and my labors. This step I take all the more willingly, seeing that Hieronymus Fabricius of Aquapendente, although he has accurately and learnedly delineated almost every one of the several parts of animals in a special work, has left the heart alone untouched. Finally, if any use or benefit to this department of the republic of letters should accrue from my labors, it will, perhaps, be allowed that I have not lived idly, and, as the old man in the comedy says:

"'For never yet hath any one attained
To such perfection, but that time, and place,
And use, have brought addition to his knowledge;
Or made correction, or admonished him,
That he was ignorant of much which he
Had thought he knew; or led him to reject
What he had once esteemed of highest price.'

"So will it, perchance, be found with reference to the heart at this time; or others, at least, starting from hence, the way pointed out to them, advancing under the guidance of a happier genius, may make occasion to proceed more fortunately, and to inquire more accurately."

The above affords us a very clear insight of the modest and lovely character of this grand old master.

This man, so noted in the history of physiological science as to be commonly styled "the immortal," and not unfrequently "the divine Harvey," occupied, in his time, many positions of trust and honor. He was appointed in 1618 physician extraordinary to James I., and subsequently physician in ordinary to Charles I. He was also a general practitioner of medicine, surgery and obstetrics. Among his distinguished patrons was the Lord Chancellor, Francis Bacon. In 1630 he was commanded by Charles I. to accompany James Stuart, the young Duke of Lenox, and afterwards Duke of Richmond, "in his travels beyond the seas." This proposed tour was not quite to the liking of Harvey, who sought in vain to have a substitute appointed. Where the royal party went is not precisely known, excepting that Italy was one of the countries visited. He returned in 1632.

Four years later he accompanied the Earl of Arundel on his embassy to the Emperor. Harvey allowed no opportunity for the increase of his knowledge of natural history and comparative anatomy to be lost. While on this tour, which was soon after the Thirty Years' War, he wrote to a friend as follows: "By the way we could scarce see a dog, crow, kite, raven, or any bird, or anything to anatomize; only some few miserable people, the reliques of the war and the plague, whom famine had made anatomies before I came." During the journey he visited several of the principal cities of Germany, and made the personal acquaintance of many of the leading medical gentlemen of that period. At Nuremberg, in May, 1636, he demonstrated the circulation of the blood to the renowned professor, Caspar Hoffmann, who was a skeptic in regard to this function, and remained so in spite of Harvey's endeavors to enlighten him.

Harvey also accompanied Charles I. to Scotland. He was with this king at the battle of Edge Hill, in October, 1642, at which time he had charge of two lads—the Prince of Wales and the Duke of York—boys of ten and twelve years of age. *Aubrey relates the following story of Harvey's coolness and indifference concerning the results of the battle:

> "When King Charles, by reason of the tumults, left London, he [Harvey] attended him, and was at the fight of Edge Hill with him; and during the fight the Prince and Duke of York were committed to his care. He told me that he withdrew with them under a hedge, and tooke out of his pockett a booke and read. But he had not read very long before a bullet of a great gun grazed on the ground neare him, which made him remove his station."

After this he went with the king to Oxford, where he was made warden of Merton College. He also received the honorary degree of Doctor of Physic from this famous University. Aubrey says it was at Oxford that "I first saw him, after Edge Hill fight, 1642, but was then too young to be acquainted with so great a doctor. I remember he came several times to our college (Trinity) to George Bathurst, B. D., who had a hen to hatch eggs in his chamber, which they opened daily to see the progress and way of generation."

It is not altogether strange that a man who would occupy his time in observing the progressive evolution of the chick *in ovo*, in the midst of such stirring times as those were, should be engaged in reading a book, in a place of presumed safety, while a battle was in progress. Harvey, though intimately associated with the king and his court, lived in other and grander spheres—the world of science and the republic of letters.

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*"Lives of Eminent Persons," 2 vols., 8°, London, 1813, v. ii., p. 379.

It was about this time that his lodgings at Whitehall were searched, and not only the furniture seized, but also invaluable manuscripts and anatomical preparations. Harvey mentions this shameful vandalism in the closing lines of the sixty-eighth chapter of his work on Generation:

> "And whilst I speak of these matters, let gentle minds forgive me if, recalling the irreparable injuries I have suffered, I here give vent to a sigh. This is the cause of my sorrow:—whilst in attendance on his majesty, the king, during our late troubles and more than civil wars, not only with the permission but by command of the Parliament, certain rapacious hands stripped not only my house of all its furniture, but what is subject of far greater regret with me, my enemies abstracted from my museum the fruits of many years of toil. Whence it has come to pass that many observations, particularly on the generation of insects, have perished, with detriment, I venture to say, to the republic of letters."

Coroley refers to this loss as follows:

" O cursed war! who can forgive thee this?
Houses and towns may rise again,
And ten times easier 'tis
To rebuild Paul's than any work of his."

In the early part of the year 1651, the second of Harvey's great works was published—viz.: "*On the Generation of Animals.*"* The author was then over seventy years of age, his mental faculties still vigorous and unimpaired. This recondite treatise was the result of many years of careful observation and diligent study.

In 1652 the College of Physicians, in testimony of its high appreciation of his distinguished merits, ordered and had placed in its hall a fine statue of Harvey.

Being a man of ample means, without children, his immediate relatives wealthy, Harvey considerately regarded the necessities and comfort of his professional brethren. He munificently bestowed money for the erection of a handsome addition to the college edifice. It was, as Aubrey informs us, "a noble building of Roman architecture (of rustic work, with Corinthian pilasters), comprising a great parlor, a kind of convocation house for the fellows to meet in below, and a library above."

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* De Generatione Animalium, 4°, London, 1651.

He enriched it with a valuable pathological museum, a medical library, a collection of surgical instruments, of curiosities, etc. He also endowed it with funds to pay the salary of the curator and librarian, and for the purpose of securing and having delivered annually "a solemn Latin oration," which has been faithfully carried out, except that recently the council have, thank goodness, changed the language from Latin to English. Harvey directs, in his deed of gift, that the orator is to exhort the fellows of the college "to search out and study the secrets of nature by way of experiment, and also for the honor of the profession to continue mutual love and affection among themselves." How characteristic of this amiable and genial scholar. The "Harveian Orations" constitute an interesting mass of medical literature. Harvey was elected president of the college in 1654; he declined to serve, saying, "The concerns of the college are too weighty to be intrusted to one like me, laden with years and infirm in health."

[To be Continued.]

EDITORIAL DEPARTMENT.

THE AMERICAN WITTENAGEMOT.

Every new journal is started for the purpose of meeting a need long felt. Every fresh book offers the same stale apology for its freshness. Journals multiply; books blossom—and occasionally fructify—through all the changing seasons; and yet to all appearance the need, whatever it may be, persists, implacable as a strangury.

So it is with our national associations. The need long felt is vaguely felt perhaps, but still it is really felt. Our need is that the wise men of the land may be induced at stated times to step down from their eminences and clamber up from their cañons, to meet upon a common level for mutual counsel and the profit of mankind.

Such a congress, if it ever assembles, will be distinctly and amply American in scope, as well as in title. The title we have already had—several times, in fact.

The American Medical Association enjoys a venerable title; but if it really embodies the wisdom of this continent, then what is to become of our people? Its design was excellent, but, like the American Electoral College, it can hardly be said to have fulfilled the design of its founders. In fact, they were not very shrewd in expecting that the wise men of a country could be hit upon with any exactness by a ballot of the county-societies. Moreover, it should have been anticipated that some counties might be destitute of *wittena;* in which case they would be sure to send full delegations to the *gemot.* This *a priori* conclusion can be readily verified, inductively, from any of the publications of the American Medical Association.

Then we have other American Associations striving to supply the need long felt. There is the American Gynæcological

Society, with its lustrous roll of membership, where some—in fact, the majority—were born great, some are achieving greatness, and some have greatness thrust upon them. But he who runs may read in the gilt-top transactions of this society that greatness in gynæcology is perfectly compatible with infinite littleness of general medical knowledge.

And we have the American Otological Society; the American Academy of Medicine, A. B.; the American Dental Association, with such of wisdom as comes of craning over *dentes sapientiæ;* the American Neurological Society, with perhaps some slight excess of gray matter; and the American Pharmaceutical Association, that misses "no dram of a scruple, no scruple of a scruple, no obstacle, no incredulous or unsafe circumstance," wherewith to block the progress of pharmaceutical science. But neither otologists nor bachelors of art, neither dentists, neurologists, nor heroes of the pestle can satisfy the long-felt need.

To whom, then, shall we look? Undoubtedly to the surgeons of the land. When they meet, in national congress assembled, there will be found the veritable American Wittenagemot. The greater will include the less; of course, otologists will be there, and dentists, and gynæcologists, and neurologists, and masters of all the arts of surgery; but they will be there as surgeons, and not as cackling specialists. In fact, all that is good and true in every department of medicine will be there. For the great surgeon is simply a great physician, *plus* a trained and skillful hand. He can say, with old Chremes in the play, "*Humani nihil a me alienum puto.*"

All that is known of anatomy, physiology, pharmacy, therapy, and pathology is essential to the perfection of his work. So in the Wittenagemot of surgery there will be found in due subordination the *satrapæ* of gynæcology, the *optimates* of otology, the *magnates* of neurology, and the *proceres* of pharmacy side by side with the *principes* of pathology.

We sincerely hope that the organization of an American society of surgeons is not to be long delayed. At the call of a Gross or a Wood it would come together, like the crystalline precipitate from a solution, and nothing could hinder it from being a power in the land.

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We had a dream, which, alas, was all a dream. The gas grew dim in our editorial chamber. The transactions of the American Dryasdust Association lay wide open before us. We had conned with patient fidelity the list of members, their titles, their officers and committees, their by-laws; and then, gradually, their subsequent proceedings interested us no more.

Tired nature's sweet restorer stole sweetly over us, and we dreamed. We dreamed that our desire had been anticipated, that the need long felt had been satisfied. We dreamed that somewhere about the Ides of June the call had gone forth and the Wittenagemot had convened; the patriarch of American surgery presided; venerable chieftains clustered round him; and the great hall was filled to overflowing with wise men crowding in to profit by the wisdom of yet wiser men.

It was a glorious dream; but we awoke to Dryasdust. Was it a dream? Impossible for such a solid vision to be of such baseless fabric. We turned back to the files of Summer journals, hoping against hope. Through the columns of that "weekly journal of medicine and surgery," which "has the largest circulation of any medical journal in the world," we search in vain. Truly our vision was but a dream. Another, and yet another journal of lesser circulation is eagerly scrutinized, but the result is the same. Ah! what is this? "American Surgical Society. This society organized June 1st, in this city. About forty persons were present at the meeting for organization yesterday. A constitution and by-laws were adopted, and the following officers elected: Dr. Samuel D. Gross, Philadelphia, President; Dr. L. H. Dugos, of Augusta, Ga., and Dr. James R. Wood, of New York, Vice-Presidents; Dr. John H. Packard, of Philadelphia, Treasurer; Dr. T. R. Weist, of Indiana, and Dr. W. T. Briggs, of Tennessee, Secretaries."

Verily the "Transactions of the American Surgical Society" have not yet become wearisome.

THE CLINIC.

1. COMPOUND COMMINUTED DEPRESSED FRACTURE OF SKULL. WIGHT. Recovery. J. E. S., aged 9. School-boy. August 26, 1880, was struck on top of frontal bone near the middle by a board falling from roof of building. Admitted to Long Island College Hospital with compound comminuted depressed fracture, brain matter protruding; did not lose consciousness; had no convulsions. Operation following day; removal of several pieces of bone of considerable size; hemorrhage marked. Recovery rapid.

2. LACERATED WOUND OF ARM. L. D. MASON. Amputation at shoulder-joint. Death from tetanus. J. B., aged 21. German. Machinist. Right arm caught between two cog-wheels; humerus comminuted; skin and superficial fascia torn off greater part of arm and shoulder; muscles much lacerated and contused; hemorrhage slight. Operation six hours after accident; profound anæsthesia could not be induced; artificial respiration necessary several times during operation; greater part of stump without skin flap. Sloughing considerable by third day; colliquative sweats. Trismus occurred about ninth day, and on the thirteenth day patient died of tetanus. No signs of pyæmia. Interesting to note delayed onset of the symptoms of tetanus.

3. STRANGULATED HERNIA. L. D. MASON. Operation. Death. C. H., aged 30. Norwegian sailor. Right inguinal hernia, indirect, scrotal of four years standing; in spite of truss compelled to reduce it several times himself. Admitted to Long Island College Hospital August 20th. Prof. Wight made unsuccessful attempt, with patient under chloroform, to reduce by taxis. Operation twelve hours after accident; gut found to be packed with feces; no gas; temperature twenty-four hours after operation 40° C. Patient's further progress satisfactory until sixteenth day, when gut again descended upon attempt at rising in bed; was replaced, and again came down about a week before death; producing no distress was not again reduced. Three weeks after operation, colic and pain in right inguinal region in attempts at defecation; no elevation of temperature at this time. Died one month after operation. Autopsy: Internal opening large enough to admit several fingers; gut attached to abdominal walls near internal ring; slight general peritonitis; calibre of intestines normal. Abscess containing about 120 c. c. of pus in right inguinal region at site of hernia. Hydronephrosis of right kidney containing about half a litre of urine; cortical portion thinned and indurated. Left kidney normal.

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ANNALS

OF THE

ANATOMICAL AND SURGICAL SOCIETY.

Lecture.

THE LOCALIZATION OF DISEASES IN THE SPINAL CORD.

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I HAVE designed this lecture as a pendant to Dr. Gray's discourse upon the new anatomy of the spinal cord and its intra-cranial expansion. In the last fifteen years advances in the normal and pathological anatomy and the physiology of the nervous centres have progressed hand in hand, one illustrating and confirming the other.

At the beginning of this century, and from that time until some fifteen years ago, though great progress was achieved in the clinical description of spinal diseases, from Ollivier to Brown-Séquard; and though we have acquired some knowledge of the pathological anatomy of the points involved, almost no attempt had been made to localize the lesions of various diseases in definite sections of the spinal cord. The admirable spinal localization of the present day, we owe to the accumulated labors of Cruveilhier, Türck, Goll, Charcot, Leyden and Erb.

I shall offer you to-night a brief review of this localization of diseases in the spinal cord, as founded upon normal anatomy, physiology and pathological anatomy. Such a study will be facilitated by admitting as practically correct a somewhat rough division of the spinal cord into two unequal regions, one including the posterior columns and the posterior gray matter, serving for the transmission of centripetal or sensory impulses, and the second, much larger, including the anterior gray horns, the anterior columns and the anterolateral columns, serving for the transmission of motor, centrifugal impulses. The former region is the æsthesodic system of the spinal cord, the latter the kinesodic system. The accompanying wood cut illustrates the limits of these two systems, on a transverse section of the spinal cord.

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* Delivered before the Society, April 12th, 1880.

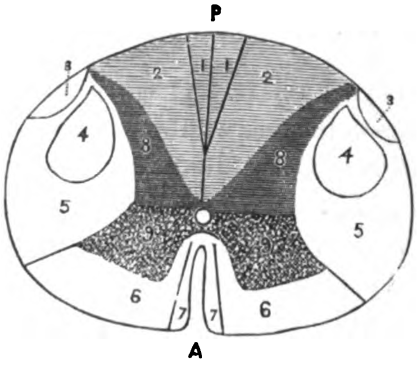

FIG. 1.

DIAGRAM OF TRANSVERSE SECTION OF THE SPINAL CORD.

A. Anterior median fissure. P. Posterior median septum. 1. Columns of Goll. 2. Columns of Gerlach. 3. Direct cerebellar fasciculi. 4. Crossed pyramidal columns. 5. Lateral columns. 6. Anterior columns. 7. Direct pyramidal columns. 8. Posterior gray horns. 9. Anterior gray horns. Stippled part—Gray matter. Shaded part—Æsthesodic system. Unshaded part—Kinesodic system.

The following table embodies the principal localized lesions of the spinal cord which give rise to definite symptom-groups, and which we are able to diagnosticate:

LOCALIZED SPINAL DISEASES.

A. Systematic diseases of the spinal cord:

1. Diseases of the æsthesodic system—

    - *a.* Sclerosis of the posterior columns (progressive locomotor ataxia).
    - *b.* Ascending degeneration.
  - 2. Diseases of the kinesodic system—
    - *a.* Degeneration of anterior ganglion cells (progressive muscular atrophy).
    - *b.* Inflammation of anterior gray horns (atrophic spinal paralysis of adults and children).
    - *c.* Sclerosis of the lateral columns (tetanoid paraplegia).
    - *d.* Descending degeneration,
      - *α.*—of spinal origin;
      - *β.*—of cerebral origin.
- B. Focal affections of the spinal cord (injuries, tumors, foci of softening, myelitis transversa, clots, etc.):
    - *a.* In lumbar enlargement.
    - *b.* In lower dorsal region.
    - *c.* In upper dorsal region.
    - *d.* In lower cervical enlargement.
    - *e.* In upper cervical region.
    - *f.* At the cauda equina.

It will be impossible to do more this evening than to consider the first of the two great divisions—viz., that of systematic lesions.

1. Diseases of the æsthesodic system:

At the present time there is only one disease of this class —viz., posterior spinal sclerosis or progressive locomotor ataxia. The lesion consists, roughly speaking, in sclerosis of the posterior columns of the spinal cord. Since 1873 closer analysis at the hands of Charcot and Pierret has shown that the primary and essential sclerosis occupies only the external part of these columns—that which is adjacent to the posterior gray horns, and which histology teaches us is traversed by fibres of the posterior roots on their way to the gray matter of the cord. In most cases which come to the postmortem table the median fasciculi of the posterior columns or the columns of Goll are likewise sclerosed, but this alteration is is to be looked upon as secondary, as a form of ascending degeneration, and probably as wholly disconnected with the symptoms. Almost always sclerosis of the external part of the posterior columns, or columns of Burdach, commences in the lumbar enlargement and advances upward. Ultimately, in old cases, the whole of the posterior columns as high as the medulla oblongata is sclerosed and degenerated, atrophied and hardened. Another part of the lesion of locomotor ataxia is a sclerosis and degenerative change in the posterior roots extending to the ganglia on these roots and even involving them. In uncomplicated cases of locomotor ataxia, the anterior and antero-lateral columns, and the whole of the gray matter of the spinal cord, are healthy. The symptoms of the disease are chiefly of a sensory sort, and there is never any true paralysis in uncomplicated cases. The chief symptom in some respects, the initial symptom in the vast majority of cases, is a peculiar, almost pathognomonic neuralgia, which usually has its seat in the lower extremities alone, and sometimes affects the upper extremities and trunk, very rarely the head. The diagnosis of locomotor ataxia depends so much upon this symptom and its exact appreciation that I need no other apology for stating its characteristics with some fulness.

a. The pains are vagrant; they occur in innumerable spots in the affected parts, so much so that patients who have long had them are unable to enumerate the localities in which they have suffered; or, rather, they can hardly name a region which has escaped.

b. The pains do not occur in the course or distribution of recognized nerve trunks and filaments; they are local pains, and this peculiarity may serve (with *a*) to distinguish between the pain of sclerosis and true neuralgia (sciatica, etc.).

c. The seat of the pain is commonly in an area of skin varying in size from that of a pea to that of a small hand. In many cases pains are referred to the muscles, to the vicinity of the bones, and even to articulations and viscera.

d. The pains are paroxysmal in a completely irregular manner; they may occur every few moments for hours in one spot, or be altogether wanting for weeks; or at times a single pain in a given region is the signal that the disease is not cured. It seems probable that the atmospheric disturbance (low barometer) which precedes a storm causes an increase in this symptom, or even calls it forth.

e. The pains are sudden, and vary in severity from the sensation caused by the penetration of a small knife-blade to that we may imagine to result from tearing through the tissues with a hook or large knife; or, the sensation is like an electric pain in suddenness. Perhaps most of the suffering in such cases is in the shape of stabbing pains in an ovoid or round area of skin (foot, thigh, arm, or shin) repeated every few seconds for hours, or even a whole day. The pain is often such as to make the strongest-willed man writhe and shriek. The seat of pain becomes hyperalgesic —*i. e.*, painful to the lightest touch; yet firm pressure may give relief. From their suddenness and electric character the pains of locomotor ataxia are often called fulgurating, or terebrating.

The *rationale* or physiology of these characteristic pains is found in the morbid anatomy. As described above, there is in this disease a sclerosis of the connective tissue in the posterior columns of the spinal cord, and chiefly in their lateral portions—*i. e.*, those portions which are traversed by fibres of the posterior roots. Irritation of these sensory nerve fibres is produced by the advancing sclerosis, and probably varies in degree according to changes in the circulation in the diseased spinal cord.

It should be borne in mind that fulgurating pains usually precede ataxia by three or four years; but this neuralgic period may be shorter (a few weeks) or much longer, perhaps indefinite (in a case of my own, twenty-nine years).

Other sensory symptoms of posterior spinal sclerosis are numbness and anæsthesia. The numbness often goes hand in hand with the pains, and is probably due to the same cause —viz., irritation of the posterior roots and their intra-spinal expansion. It usually affects the feet first, and seems to ascend. When the upper extremities are involved, the numbness first shows itself in the finger tips.

Anasthesia is present in a large majority of cases; probably in all which enter the second period—viz., the ataxic period. It may progress to such an extent as to make the patient perfectly unaware of any excitation applied to the legs (or hands); and to render him ignorant of the positions and existence of the limbs without the aid of sight or touch, the patient "loses his legs in bed." The anæsthesia is caused by the actual destruction or great compression of the sensory fibres already referred to.

Destruction of the myeline and pressure on the axis cylinders by the sclerosed interfibrillar tissue may also explain a singular symptom—viz., the retardation of sensations—*i. e.*, the occurrence of a measurable time (10 to 120 seconds) between the pricking of a part and the acknowledgment of the pain by the patient.

Other symptoms of scelerosis of the posterior columns are motor to all appearances, yet in reality depend upon interference of the disease with the spinal sensory apparatus.

First. Diminished reflexes, pupillary, cutaneous, tendinous and visceral. For example, in many cases the pupils are small (may be unequal), and do not appreciably respond to light and shade, though they do change under accommodative efforts.

Again, if we tap the ligamentum patellæ in a patient suffering from fulgurating pains, or in one who has entered the ataxic stage, we observe that the quadriceps extensor femoris does not contract and cause a movement of the leg (the knee being semi-bent) as in health. This is known technically as absence of the patellar reflex, a new and most important symptom of posterior spinal sclerosis, one which in my experience hardly ever fails, and which deserves to be ranked as at least equal in importance with the fulgurating pains. Reflexes from cutaneous surfaces are also diminished or lost. The visceral reflex actions by which we micturate, defecate, and produce the sexual orgasm are likewise progressively impaired; and thus we find these patients impotent as a rule, and presenting constipation and slow, imperfect micturition as symptoms.

This reduction in reflexes is caused by disease of the intra-spinal sensory parts connected with the various organs and parts we test; the arc for reflex actions is impaired in the posterior columns of the spinal cord or in corresponding regions of the spinal tract.

The ataxic movement of the legs (and of the arms in some cases) which are characteristic of the second stage of the disease, appear at a variable period after the beginning of the neuralgic stage (three months to ten years or more) and is essentially characterized by an irregular, asynergic action of the muscular groups which serve to produce a given movement. The legs are jerked forward and outward, and the heel brought forcibly down in the attempt to walk; the fingers and arms oscillate and perform unnecessary excursions in trying to reach a given point, or accomplish a given action. Later, the irregularity of movement is so great that the patient is confined to bed.

We are not yet agreed upon a theory of ataxia, but these hypotheses are deserving of consideration.

a. That interference with sensory intra-spinal tracts diminishes the muscular tonus (chiefly produced in an unconscious reflex way), and that this atony varying in different muscles gives rise to the inharmonious movements.

b. The anæsthesia affects the muscles as well as the superficial parts, and thus diminution or loss of the "muscular sense" is caused and the patients can no longer guide their contractions.

c. The sclerosis of the posterior columns affects other fibres besides common sensory ones—viz., those arciform or longitudinal commissural fibres described by Lockhart Clarke, and which seem to unite, for the purpose of harmonious action, the spinal centres for the various muscles of a group, or of a limb. If these commissural fibres be destroyed by sclerosis, we obtain ill-combined, asynergic muscular movements in the attempt to step.

There are many other symptoms in the course of posterior spinal sclerosis, but those just analyzed are the characteristic ones—the ones which are logically related to the lesion.

Under the head of diseases of the æsthesodic region we must also place the lesion of the posterior columns known as ascending degeneration. This lesion is limited to the posterior median columns, or columns of Goll, and diminishes in extent the higher we examine the spinal cord. We find this ascending degeneration above a spot in the spinal cord where it is compressed, or destroyed, and it is also met with in progressive locomotor ataxia. Prof. Charcot and others teach that this extension of sclerosis from the columns of Burdach to the columns of Goll is a non-essential feature of locomotor ataxia, and is secondary. At any rate sclerosis or degeneration of the posterior median columns alone does not, as far as we know to-day, give rise to any special symptoms; hence I can give you no clinical picture to accompany the pathological statement. We know only that the lesion exists in a living patient by learning the pathological state of the cord from other symptoms present.

2. Diseases of the kinesodic system, including the anterior gray horns, the anterior columns, the antero-lateral columns, and the postero-lateral columns (or crossed pyramidal fasciculi).

There are, as indicated in the table, several very definite and distinct affections of those parts.

a. Degeneration of ganglion cells in the anterior horns. In this disease the protoplasm of these cells is very slowly transformed into granulo-fatty material, the cell processes are broken off, the nucleus and nucleolus destroyed, and in later stages there remains of the cell only a small mass of granules, or its place in the tissues may be vacant. These changes take place with extreme slowness, and the symptoms are correspondingly gradual in their appearance. For reasons which we do not understand, this granular degeneration may be limited to a few groups of ganglionic cells, or may involve a large number of the cells from the medulla oblongata to the end of the cord. We are not acquainted with the lesion above the medulla, although there is no reason why the nuclei of the fifth, sixth, seventh, fourth and third cranial nerves should not suffer. I wish to lay particular stress upon the slowness of the degeneration because of its harmony with symptoms, and its contrast with allied states.

Degeneration of anterior ganglion cells is externally expressed by muscular atrophy—usually progressive muscular atrophy. This singular disease shows itself often first in peripheral muscles, in hands and feet, in other cases it attacks the shoulder, arm and thigh muscles. Indeed, it may commence in any muscular group. Yet there are certain characteristic peculiarities in this wasting.

1. It is very gradual; fasciculi after fasciculi in the muscles undergo a diminution in size, lose their faradic contractility,

and disappear, while adjacent fasciculi remain normal. There is no *paralysis* of a muscle, but a partial and gradual death of its constituents.

2. The atrophy affects, in the vast majority of cases, symmetrical and homologous parts. For example, both shoulders may be wasted, or the arms and thighs, or the forearms and legs. Unilateral muscular wasting is presumably not progressive muscular atrophy.

3. The muscles which are undergoing the early changes of this wasting are the seat of what are called fibrillary contractions. These are produced by the involuntary rapid contraction of fasciculi of muscular fibres in a muscle. Sometimes a patient is covered with them. Some years ago these fibrillary contractions were held to be pathognomonic, but I can assure you that this is not so, as they may be observed in lead palsy, in conditions of neurasthenia, in simple paralysis. Indeed, many years ago, Prof. Schiff, now of Geneva, showed that muscles separated from their motor nerves were prone to show fibrillary contractions.

The electrical reactions are diminished, but not altered in quality; and the reduction or loss of reaction (to faradism) is in direct proportion to the wasting. In partly-atrophied muscles some fasciculi look well and contract well, while their neighbors are thin, and rise but feebly under faradism.

Uncomplicated degeneration of ganglion cells is unaccompanied by numbness, anæsthesia, or vesical symptoms, though aching pains may be present in the affected regions.

b. Inflammation of the anterior gray horns; myelitis anterior in adults and in children.

Autopsies have shown that the lesion in this disease involves the anterior and central gray matter of the spinal cord, and that there may also be present, as secondary conditions, atrophy and degeneration of the antero-lateral columns (not distributed as in regular descending degeneration). The ganglion cells of the affected anterior horns are found in various states of change — swollen, containing vacuoles, filled with granulo-fatty matter, or shrunken and almost destroyed. Besides, the neuraglia round about these cells is always more or less altered. In some cases the lesion might be designated as a diffused central myelitis with destruction of anterior ganglion cells. It need hardly be added that there exists an absolute anatomical relation between the level at which the changes occur in the spinal cord and the distribution of symptoms at the periphery.

The symptoms of myelitis anterior are chiefly motor, very much as in group (*a*); but the morbid process being comparatively or absolutely rapid, they appear in a strikingly acute or sub-acute form.

First. Paralysis.—In some few cases this appears with almost apoplectic rapidity (suggesting hæmorrhage in the cord); in the majority the paralytic phenomena are complete in one or two days. Often we learn from the mother of a child who has myelitis anterior (infantile spinal paralysis) that she put the child to bed well, or simply a little feverish, and that the next morning both legs, or one extremity, or all the limbs were limp and paralyzed. In a minority of cases (adults) the muscular groups in the limbs lose power slowly, and a week or several weeks elapses before the patient is obliged to lie a-bed. It is important to contrast this paralytic loss of power, affecting a whole limb, or a whole muscular group, with the atrophic failure of power, or the fascicular atrophy described under the head of "Progressive Muscular Atrophy."

Second. Atrophy of muscles.—The palsied muscles in myelitis anterior always undergo, in the course of the first four or five weeks, marked and even extreme atrophy. This wasting, even in the most sub-acute forms of myelitis anterior, is rapid as compared with the most rapid forms of progressive muscular atrophy. Besides, in the former disease, the atrophy, like the paralysis, always affects a whole muscle, or a muscular group, or the muscular apparatus of one or more limbs, *en masse*, and is not, as in the latter affection, fascicular in distribution. Fibrillary contractions in wasting muscles are common in progressive muscular atrophy, and very rare in myelitis anterior.

Third. Remarkably distinct evidences of the degeneration reaction to electricity are obtained from the second to the tenth week. The nerve-trunks supplying the paralyzed muscular groups lose their excitability to faradism and galvanism, and these wasting muscles react only to galvanism, and that their reaction formula is altered from the normal; in general terms, we may say that An c c = Ka c c, or even An c ċ > Ka c c; and all contractions are slow and wavelike.

Fourth. The distribution of the paralysis is important for diagnosis and prognosis. In myelitis anterior the bladder and rectum are never paralyzed, and it is exceedingly rare to observe paralysis of the respiratory muscles, and of those which serve for deglutition. On the other hand, muscles supplied by the cranial nerves may be paralyzed.

Fifth. An important symptom not usually referred to is abolition of reflexes in the paralyzed parts, especially the tendon reflexes. For example, if the muscles of the thigh (quadriceps extensor femoris) be paralyzed, no patellar tendon reflex can be obtained, just as in posterior spinal sclerosis. The mechanism is in both affections the same, but in either case different portions of the spinal arc serving for reflexes are injured; in posterior spinal sclerosis the centripetal (sensory) portion of the arc is destroyed; in myelitis the anterior (motor) portion. At an early stage of myelitis anterior, and in cases (infantile) where much fat serves to obscure atrophy, this negative symptom acquires great value.

Sixth. Sensory symptoms are very slightly developed in myelitis anterior. In some cases a degree of numbness or other paræsthesia is experienced in the paralyzed limb for a few hours or days. In others severe neural pains are experienced. I style these neural because they apparently are in the course of nerve trunks or large branches, and are not in spots or patches like the fulgurating pains of posterior spinal sclerosis. Although the suffering in some few cases of myelitis anterior may be very severe, yet it is only careless observers who could mistake these pains for those of locomotor ataxia. Anæsthesia is never present in myelitis anterior. When it is observed in any marked degree the case should be designated as diffused central myelitis.

Seventh. Fever is present in a majority of cases in children and adults. Other peculiar symptoms are vomiting, œdema of the extremities, hyperæsthesia of affected parts, delirium. These rare symptoms occur in the first stage of the disease. In the atrophic stage the patient's general health is usually good.

c. Sclerosis of the lateral columns has been recently described by Erb (1875) and Charcot (1876) as probably an independent or protopathic lesion of the spinal cord. To the symptom-group characteristic of this lesion, Prof. Charcot has given the name of spasmodic tabes, Prof. Erb that of spastic spinal paralysis. I have proposed the name of tetanoid paralysis or paraplegia, which seems to me most expressive.

The pathological anatomy of this affection is not as yet well established; it is doubtful if the lateral columns generally are sclerosed, or whether the lesion is limited to their posterior positions, as in descending degeneration (*vide infra*). The lesion is always (?) bi-lateral. Another uncertain point is whether the lateral sclerosis is primary or secondary—*i. e.*, due to a focus of disease centrally placed above the beginning of the sclerosis. It seems to me that the weight of evidence is in favor of the latter view.

The symptoms of tetanoid paraplegia consists in slowly increasing paresis in the legs (and arms rarely) with tendency to contracture and increase in all reflexes. The loss of power is exceedingly slow. The patellar tendon reflex is increased very early in the disease, and becomes greatly exaggerated. The skin of the feet form the starting point of reflex muscular contractions when the patient is awake. Except at the close of the disease the affected limbs are relaxed in sleep. As a result of this increase of reflex action, there is a peculiar attitude and gait. The legs tend to cross one another, or actually do so from over-action of the adductors. The heel is drawn up, or at any rate raised, by over-action of the gastrocnemii and solei; the legs in stepping are stiffened, their muscles sensibly hardened. The extremities are in a tetanoid condition. In later stages, in bed-ridden patients, the legs may be fixed in semi-flexion and adduction. These symptoms indicate clearly that the proper spinal activity, its reflex and automatic activity, is increased.

Another motor disturbance, due to increased reflex action, is precipitate micturition and defecation. The patient must hurry, as from increased reflex action the bladder and rectum are apt to contract suddenly and involuntarily upon their contents. We have here an example of incontinence through spasm—a condition to be carefully distinguished from paralytic incontinence. The muscles in parts affected with tetanoid paralysis retain their volume, nutrition, and normal electrical reactions.

Sensory symptoms are practically wanting in this disease; there is no anæsthesia, and seldom numbness.

If there were time I should like to draw a contrasting picture between this condition and sclerosis of the posterior columns; you can, however, easily do it for yourselves.

In little children we not very rarely meet with the symptoms of tetanoid paralysis involving the legs alone, or all the limbs. The child cannot stand or walk because of the spasmodic condition of the legs and the apparent absence of cerebral stimulus; no anæsthesia is present. In some cases we find microcephaly and idiocy conjoined. Prof. Erb was the first to describe these infantile forms (1877), and he is disposed to think that pathological researches will show as lesions, sclerosis or want of proper development in the postero-lateral colums. I incline to the view that in these tetanized children the entire motor tract, from its cortical (cerebral) starting point to its distribution in the spinal cord, is more or less incompletely developed. The operation of circumcision is still gravely advocated as a cure for infantile tetanoid paralysis, but we have no recent and uncontradicted statements of cures; besides, in my experience, Jewish children fully circumcised from birth frequently come to my clinic with these symptoms.

A combination of *b* and *c* is recognized under the name of amyotrophic lateral sclerosis (Charcot).

In this affection the lesions proper to *b* and *c* respectively are found in the spinal cord—viz., destruction of the anterior ganglion cells, and sclerosis (degeneration, probably) of the postero-lateral (or crossed pyramidal) columns.

The symptoms correspond. We have a paralysis with atrophy in the upper and lower extremities, followed by contractions, with increased reflex in the non-atrophied and non-paralyzed muscles.

d. Descending degeneration: *α.* Of spinal origin. This takes place when the physiological continuity of the spinal cord is interrupted. For example, after division of the cord with a knife, after great pressure from a tumor, or from a displaced vertebra, or from a focus of transversely localized myelitis, we observe these changes. They differ completely above and below the seat of pressure or of section. Above the lesion we find an alteration almost limited to the posterior median columns (columns of Goll) extending indefinitely upward toward the apex of the fourth ventricle. The degenerated tissue appears in transverse sections as a wedge-like area with its base resting on the pia mater and its apex not quite reaching the posterior commissure (see Fig. 1). Careful examination often shows on each side of the cord another tract of altered nerve tissue—viz., a portion of the postero-lateral columns lying posteriorly to the crossed pyramidal column, and extending to the pia mater and the posterior gray horn—the so-called ascending cerebellar fasciculus (Flechsig).

Below the lesion dividing the spinal cord the degenerations are found chiefly in two locations. First, in the crossed pyramidal columns (see fig. 1); and, second, in the anterior columns, or, physiologically, the direct pyramidal columns. In these columns the descending degeneration extends to the lowermost portion of the cord. A more complete description of these columns will be given in the next section.

The symptoms of the ascending degenerative changes, if there be any, are now unknown. As regards descending changes, they very probably are expressed by a more or less defined tetanoid state of the paralyzed limbs. In some cases this is well marked, and constitutes the spinal epilepsy of Brown-Séquard, or may resemble the symptom-group (*c*) attributed to the primary (?) lateral sclerosis. No sensory symptoms accompany either ascending or descending degeneration.

β. Descending degeneration of cerebral origin:

In this condition the foci of disease are found above the decussation of the anterior pyramids; by far the greater number within the cerebral hemispheres. The nature of the lesion is, of course, immaterial, providing it be a desrtuctive one. Such, for examples, are clots in the motor regions of the brain (more especially involving the anterior two-thirds of the internal capsule), patches of softening involving the motor convolutions or tumors in similar locations. Usually such a lesion is uni-lateral, but once in a while bi-lateral lesions exist, and we must be prepared for the existence of bi-lateral symptoms.

From the focus of disease in these motor convolutions, or in the associated fasciculi of the corona radiata, the internal capsule (directly or indirectly involved), in general terms from the central part of the motor tract described to you by Dr. Gray, we can trace the degenerative changes with the naked eye (after six or eight weeks) to near the end of the spinal cord, through certain well-known columns or fasciculi of the cerebro-spinal apparatus. Let us take an example: A patch of softening involving the motor convolutions bounding the fissure of Rolando in the right hemisphere, now known to be the source of direct innervation for the left upper and lower extremities. Beneath the patch there is an altered bundle of fibres of the corona radiata, extending downward in the anterior (or middle) portion of the internal capsule; thence into the right crus cerebri, the right inferior half of the pons, the right anterior pyramid of the medulla oblongata. At the base of the brain, in the crus, pons, and medulla the degeneration is superficially evidenced by an atrophy of the parts and cord. Below the medulla oblongata the changes are to a considerable degree invisible to the naked eye, but appear upon transverse sections of the spinal cord. On examining such sections we find changes in different localities in the two halves of the spinal cord. In the immense majority of subjects, the evident, the principal change, or secondary degeneration, is found in the *left* posterior lateral column, or, more strictly speaking, the crossed pyramidal column, so called because it is the continuation across the median line of the anterior pyramid which has (partially) decussated at the point known as the pyramidal decussation. The exact location of this bundle (in the transverse section) varies somewhat at different levels in the spinal cord. In the upper cervical region it lies deep in the lateral columns, and as we examine sections made lower down we find it more posteriorly and laterally. It is always in the posterior-lateral column, to use a rough anatomical term, and never quite reaches to the periphery of the cord; it diminishes in size (area) from above downward, and is quite lost to the naked eye in the lower lumbar enlargement. In this crossed pyramidal column (see fig. 1), I repeat, the principal descending degeneration is found. The other, smaller descending lesion, in our supposed case, is found in the right half of the spinal cord—*i. e.*, on the same side as the original disease and the intra-cranial degeneration-paths. This second spinal degeneration involves the anterior column of the cord, strictly speaking—*i. e.*, that fasciculus which lies between the anterior median fissure and the anterior gray horn—the so-called column of Türck (see fig. 1). This column embraces those fibres of the anterior pyramid which have not crossed the median line; hence the better name for this fasciculus is the direct pyramidal column. In our supposed case we find the right anterior column more or less altered throughout the length of the cord.

To sum up: Below the pyramidal decussation the secondary degeneration is found both in the crossed and the direct columns derived from one of the pyramids—the right in our hypothetical case.

A most important law, discovered and abundantly proved by Prof. Flechsig, of Leipzig, is that of *variability in the pyramidal decussation.* He found that in most of his specimens the crossing took place as above described, the great majority of pyramidal fibres from the anterior pyramid crossing the median line and going to form the crossed pyramidal column, while a smaller number remained uncrossed and constituted the direct pyramidal column. But in one of his fœtuses this was reversed—*i. e.*, the direct pyramidal column was much larger than the crossed column. In several instances he found a degree of equality between the two columns derived from a pyramid. He concludes—and I entirely agree with him—that we must look upon the old law of decussation of motor fibres as liable to rare but remarkable variations. One result of such reversal of the law of decussation in a given individual would be to cause the paralysis from a cerebral lesion to appear on the same side of the median line. Although Brown-Séquard has written on the subject of paralysis from cerebral disease since the publication of Flechsig's great work (1876), he ignores these facts, which are alone sufficient to maintain the accepted hypothesis of cerebral motor action, and also to completely refute his iconoclastic theories, since, if we admit that sometimes the pyramidal distribution is chiefly direct, we must deny the value of Brown-Séquard's three hundred cases of paralysis on the same side as the cerebral lesion. As long ago as January, 1878, I made use of this argument, which to my mind is convincing.

To return to the subject of descending degeneration:

Its symptoms consist in increased reflexes (from tendons especially) and contracture, in the wholly or partially paralyzed parts; arm and leg, rarely the face. It is useless to further describe this condition which we all see so often in uncured cases of hemiplegia. I would, however, call your attention to one important fact which I believe I was the first to notice and draw a conclusion from—viz., that during sleep in a warm bed the affected limbs are wholly or partially relaxed, and contract at once upon waking or upon exposure to the cooler air. I need hardly add that the contracture, like the paralysis, in hemiplegia, is greatest in peripheral parts.

The classic theory of the physiology of contracture in hemiplegia is that it is due to the secondary degeneration—*i. e.*, actively caused by the lesion of the postero-lateral column. Seven years ago (see Archives of Scientific and Practical Medicine, vol. I, p. 106, 1873) I rejected this hypothesis, and suggested a different one, which I have since elaborated and taught in my clinical lectures at the College of Physicians and Surgeons, New York. This hypothesis, which I intend shortly to publish in detail, is briefly that the spasm is due, not to direct irritation from the sclerosed (?) tissue in the postero-lateral column, but to the cutting off of the cerebral influence by the primary lesion, and the consequent preponderance of the proper or automatic spinal action—an action which is mainly reflex. This theory explains the phenomena observed in cases of primary spinal diseases with descending degeneration (α) and can be reconciled with results of experiments on animals (increased reflex power of spinal cord after a section high up, Brown-Séquard's; inhibitory power of encephalon on spinal cord, Setchenow).

Want of time will prevent us from considering the focal affections of the spinal cord, classed in the table under section B.

Society Reports.

STATED MEETING, SEPTEMBER 20, 1880.

MALIGNANT TUMOR OF THE PANCREAS.

E. H. BARTLEY, M. D.

The following case is presented as a contribution to the very scanty literature of affections of the pancreas. It is of special interest from a diagnostic point of view, as illustrating the difficulties attending a certain diagnosis of many abdominal affections:

About six years ago the patient—a farmer, then 22 years of age—complained of a dull pain under the ensiform cartilage, which he attributed to a strain from lifting. This pain continued at intervals for about a year, when it gradually ceased. After about two years it returned. From the date of its return the pains were felt with a gradually increasing frequency, being always produced by lifting, running, or other violent exercise. About a year and a half ago the pains became so frequent and severe that he consulted a physician, and was told that he had dyspepsia. He obtained but slight relief, however, and passed through the hands of four or five physicians. Owing to the symptoms pointing to the stomach—viz., pain after eating, and vomiting—the diagnoses of gastralgia and cardialgia were those which had been made. As he experienced no relief from his treatment, and as he was finally prevented from doing any hard work on his farm, he was recommended to go to Chicago, Ill., to consult an eminent practitioner of that city. At this time, about a month previous to his death, the emaciation was very great, and appetite very poor, owing principally to the pain caused by food in the stomach. He also vomited his food frequently, but never vomited any blood. There was considerable shortness of breath, which he said had been getting worse of late. No observations on the character of the stools, unfortunately. His skin was sallow, and he was very anæmic, almost cachectic, although it seems that the attention of his attending physicians was not especially attracted by it. There was a marked peculiarity in the movements of respiration, which consisted in a sort of bellows-like movement of the anterior abdominal wall in the epigastrium. This movement was so marked and violent that the Chicago physician, after an examination, diagnosed rupture of the diaphragm. From this time the dyspnœa increased quite rapidly, although he continued to do some light work until a week before his death, but with great difficulty. His dyspnœa increased until November 21, 1879, when he died. His pulse for some time before his death was quick and thread-like.

The post-mortem examination, at which I was present, showed that the diaphragm and stomach were apparently sound and normal, except that the stomach was bound down, especially at the pylorus, to a tumor situated in the pancreas. This latter organ was about the size of a man's wrist, while the head was increased to nearly the size of a man's fist. It was adherent to the stomach in front, to the upper end of the duodenum and to the liver, and embraced the splenic vein, the inferior vena cava, the portal vein, hepatic and gastro-duodenal arteries. A chain of greatly enlarged glands extended down from the tumor along the aorta and vena cava to the point of their bifurcation. The spleen, stomach, and intestines were considerably congested. The lungs and heart seemed to be normal. The growth was quite firm in consistence, as might be expected from its history. A microscopical section showed, besides hypertrophied gland tissue, a spindle-celled growth—probably a carcinoma of slow growth, a scirrhous cancer, or possibly a spindle-celled sarcoma; more likely, I think, the former.

I have given the history of this case in considerable detail, in order to bring before you the symptoms as completely as possible. Diseases of the pancreas are seldom met with, little understood, and very difficult to diagnose. Prof. A. Flint says of tumors of the pancreas, that "as a general statement they defy diagnosis."

The principal features of this case were pain under the sternum and in the region of the stomach, increased by food or exercise; vomiting of food; emaciation; difficult respiration, with gradually failing strength, and a peculiar, bellows-like motion of the epigastrium in breathing.

The explanation of this latter phenomenon is not very evident: whether it was merely an exaggerated abdominal respiration, or whether it was an expansion of the diaphragm more in front than usual on account of the tumor and stomach preventing the proper expansion toward the posterior part: for the stomach was well bound down to the tumor, as also was the liver.

Melancholia was a prominent symptom during the progress of the disease.

TUMOR OF THE MESENTERY; REMOVAL BY ABDOMINAL SECTION; RECOVERY.*

E. H. BARTLEY, M. D.

In connection with the preceding case, as still farther illustrating the obscurity necessarily attending certain abdominal affections, I also present a report of a recent case of tumor of the mesentery, diagnosticated with certainty only after exposure by abdominal section, and then removed by M. Tillaux, of Paris. The patient was presented to the Academy of Medicine of Paris, August 17, 1880, and the case reported by the operator:

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* Translated from the *Concours Médical.*

The patient, a man; æt. 31; of an excellent, robust constitution; was on the Boulevard Bonnes Nouvelles on the evening of May 25th, about 7 o'clock, when suddenly, and without apparent cause, he was seized with a pain in the abdomen, so violent as to compel him to bend double and remain immovable in this position for about fifteen minutes. After an interval of about fifteen minutes it returned again, each time causing him to bend double and causing him to suffer great agony. He tried to lie down, but the suffering was so great that he could not help rolling on the ground, despite the anodyne remedies which were administered to him.' The following day the suffering continued with the same intensity, in spite of all that could be done for him. On the day following this he was taken to the Hospital Lariboisière, where there was found in the abdomen a round tumor, which was thought to be a floating kidney. The patient remained at this hospital until the 15th of June, continuing to suffer the same pain, and with an almost absolute inability of going to stool, in spite of both purgatives and injections which were administered. The constipation continued obstinate from the day of the accident.

On the 15th day of June the patient was removed to the Hospital Beaujon, where he was received into the service of M. Millard, who at first accepted the diagnosis of floating kidney which had been made at the Hospital Lariboisière. At this time the pain was no longer continuous, but came in paroxysms, recurring about once an hour, and giving to the patient the sensation of a red-hot bar traversing his abdomen, and especially when he attempted to take food. It was impossible for him to lie either on his back or side, owing to great dyspnœa. He could only rest easy when he sat on his bed bent double, with his head resting upon his knees. This continued up to the end of June, during which time he had been seen by several physicians and surgeons, and particularly by MM. Leon Le Fort and Tillaux, whom M. Millard had asked for advice. M. Millard had arrived at the diagnosis of chronic invagination of the intestines. M. Tillaux, on the other hand, made the diagnosis of a fixed tumor, although with some mental reservation, but made it by exclusion, not being able to find anything else. The patient, an intelligent man, affirmed on several occasions, when questioned, that he had never felt a tumor in dressing himself or in fastening his belt, which he habitually wore. A continuous current of electricity was applied, which seemed at first to diminish the tumor a little. All the usual means of overcoming the constipation were again used, and almost with no result. It was then that the patient urgently asked for an operation to relieve him from his suffering, although he knew what the operation was which he would have to undergo, and what might be the outcome of it.

M. Millard asked M. Tillaux to take the patient into his service, which he did. After consulting with his *confrères*, he decided to undertake the operation. It took place on July 3d. He made an incision through the abdominal walls long enough to admit the entire hand into the peritoneal cavity. Inserting the hand, he found a round tumor about the size of the head of a fœtus at term, situated upon the right side of the mesentery which fastens the intestine to the spinal column. It was evident to him that he had to deal with a cyst of the mesentery. He first punctured it with a trocar, then slit it open with a bistoury and evacuated from it caseous matter resembling thick cream. Catgut sutures were then thrown around the base of it, tied, and then the whole of the tumor cut off above them. There then remained only a frill formed by the constriction of the pedicle by the sutures. The pedicle was touched with a strong solution of carbolic acid, the organs returned to their places, and the wound closed by sutures and covered with the ordinary carbolic dressing.

The sequelæ were of the most happy kind. The pain ceased as by magic; and at the end of three or four days the wound had healed by first intention. From that time the recovery was complete. The patient eats, drinks, sleeps, and, in a word, performs all his functions in a normal way.

The histological examination of the tumor showed it to be composed of a lymphatic gland (*ganglion*) containing a fatty matter of the consistence of very thick cream.

This case is somewhat unique, I believe, and is, therefore, of no small interest as a contribution to operative medicine. The most interesting point of the history is, how could a tumor or cyst remain so long benign and painless, and then become suddenly so painful? When we take the obstinate constipation into the account, it seems to me probable that the sudden pain must have been the result of fecal impaction at the seat of the tumor, where the intestine was narrowed somewhat by the presence of the tumor. The stricture being suddenly relieved by removal of the tumor, the pain ceased and the feces moved on, thus relieving the over-distended gut. This explanation seems the more probable from the absence of any severe constitutional disturbance, as fever, chill, or exhaustion. This will also, to my mind, partially, at least, explain the great dyspnœa experienced in lying down.

As a contribution to surgery it strikes one, at first, as a rather startling and, perhaps, a bold procedure. But when we consider how often the abdominal cavity is opened in the female, and with recovery, it does not seem nearly so extreme a measure as at first. When, however, the surgeon is called upon to operate, as in this case, upon a doubtful diagnosis, the case stands out as a bold step.

In the discussion which followed the presentation of the patient to the Academy, the following significant remark fell from the lips of M. Gosselin, who declared "that he had been brought to admit that gastrotomy might be attempted to complete a doubtful diagnosis."

HIP-JOINT DISEASE OF TRAUMATIC ORIGIN; EXTENSIVE DESTRUCTION OF BONE WITH ANKYLOSIS.

HERBERT C. ROGERS, M. D.

Dr. H. C. Rogers presented an innominate bone, the bottom of the acetabulum, and a part of the body of the pubic portion of which had been destroyed by caries; firmly welded to the acetabular margin, and fixed by osseous ankylosis was the shaft of the femur. The head and neck of the femur had been entirely destroyed, and the upper end of the bone, being the summit of the great trochanter, protruded upon the dorsum ilii an inch and a half above the upper margin of the acetabulum.

The specimen had been removed, *post mortem*, from a male, aged 44 years, who eight years previously had suffered a lightning stroke which felled him to the ground, he falling upon the right hip. Two weeks after the fall he was able to walk about on a crutch; six months later, a large abscess having formed at the seat of injury, it was opened and discharged a large quantity of pus, with several fragments of bone. During the years that had passed since that time, he had remained bed-ridden, fragments of bone working out from time to time, in all about twenty pieces having been cast off. At the time of his death there were still two open sinuses—one in front of the groin and the other on the outer side of the thigh below the great trochanter; these communicated with a purulent cavity in which were some small, loose fragments of bone. The right thigh was flexed and adducted so that the right knee rested over the middle of the left thigh; the right leg was flexed and the foot inverted; the whole limb was shortened.

Death was caused by pulmonary tuberculosis. No amyloid degeneration of the kidneys or liver found upon autopsy.

A CASE OF ABSCESS OF THE LUNG PERFORATING THE CHEST WALL.

WALTER B. CHASE, M. D.

Mrs. S., aged about 22, first came under my care October, 1878, at the time of her second confinement. She was a blonde, of medium height, slight figure, and exhibited to a high degree evidences of a strumous diathesis. Her mother and several maternal aunts died of pulmonary tuberculosis during early adult life. Her getting up after this labor was slow and unsatisfactory, and during the subsequent Winter she suffered almost constantly with sub-acute bronchitis. Her history for the succeeding ten years was that of chronic pulmonary tuberculosis, eventuating in small abscesses in the apex of either lung—mostly the right—threatening her life, but from which she always rallied after quite a prolonged illness. The treatment during this period was of the restorative kind, consisting principally of cod-liver oil, alcoholic stimulants, and iron. From repeated abscesses forming in the superior and middle lobe of right lung, there was resulting destruction of lung-structure, attended with some contraction of chest walls. During the latter part of November, 1878, she called my attention to pain and swelling in the right mammary region. There was evidence of periosteal inflammation of the third and fourth ribs. December 12th I found the gland more swollen and tender, and presenting the ordinary appearance of mammary abscess, as seen in the puerperal condition. It was evident suppuration could not be avoided, and warm poultices were ordered. December 15th. Fluctuation being general, opened abscess.

The patient, who was a very intelligent lady, had for some days insisted that the abscess communicated with the lung, as she could feel the movement of air in the cavity of the abscess within the gland. Very audible gurgling was recognizable on auscultation. The opening of the abscess demonstrated the correctness of this opinion. On withdrawing the bistoury, about a pint of pus was evacuated, attended with the escape of air. An effort was made to close the opening temporarily by strapping the breast with adhesive plaster, which was only partially successful for a few days. The admission and egress of air from the opening into the abscess could be heard with distinctness in all parts of the room occupied by the patient. About a week subsequent to the opening of the abscess the discharge became somewhat offensive, and with a view of correcting this condition I repeatedly injected its cavity with warm, carbolized water. On one occasion a portion of this fluid escaped, entering the pulmonary portion of the abscess within the lung, causing considerable asphyxia, which for a few moments threatened serious consequences. Relief came by coughing and expectorating this carbolized water. She gradually became weaker; the discharge from the abscess became more profuse until she died from exhaustion, January 13, 1879—28 days from the opening of the abscess.

This opening directly into the lung embarrassed her breathing, and particularly for the last twelve hours the respiration was difficult in the extreme. For 24 hours preceding her death the escape of air from the opening was more marked, producing a whistling sound audible in an adjoining room, and could be only partially prevented by digital pressure upon the parts.

No autopsy was permitted. There was evidence that the integrity of the ribs under and contiguous to the mammary gland was destroyed, either from disintegration or absorption. There was such adhesion of the pleura that neither air nor fluid escaped into the pleural cavity.

Historical and Bibliographical Notes.

A SERIES OF SKETCHES OF THE LIVES, TIMES AND WORKS OF THE OLD MASTERS OF ANATOMY AND SURGERY.

By GEORGE JACKSON FISHER, M.D.

XI.—WILLIAM HARVEY (CONTINUED).

1578—1657.

ENT, the intimate friend and champion of Harvey, with some difficulty obtained the manuscript of this great physiologist's work —"De Generatione Anamalium"—which otherwise might have passed into oblivion. Harvey had already exceeded the age of three-score-and-ten, and had quite withdrawn from the more active scenes of life, and now was living in pleasant retirement with one of his affluent merchant brothers, when Sir George Ent, at Christmas, 1650, paid him a friendly visit, concerning which event he says: "I found him in his retirement not far from town, with a sprightly and cheerful countenance, investigating, like Democritus, the nature of things. Asking if all were well with him—'How can that be,' he replied, 'when the State is so agitated with storms, and I myself am yet in the open sea? And, indeed,' added he, 'were

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not my mind solaced by my studies, and the recollection of the observations I have formerly made, there is nothing which should make me desirous of a longer continuance. But, thus employed, this obscure life and vacation from public cares, which disquiet other minds, is the medicine of mine.' " Ent then relates a conversation between them, and how the work was referred to, and how Harvey assented to placing his observations in his friend's hands, with permission to publish them immediately, or to suppress them till some future time. "I went from him," says Dr. Ent, "like another Jason in possession of the golden fleece, and when I came home and perused the pieces singly, I was amazed that so vast a treasure should have been so long hidden, and that while others with great parade exhibit to the world their stale trash, this person should make so little account of his admirable observations." The following year (1651) the work was published at London in quarto.

The few remaining years of his life Harvey devoted to the welfare of the Royal College of Physicians, as has already been mentioned. As an evidence of his affection for this institution, we find the following item in his will:

> "Touching my bookes and house-holdstuffe, pictures, and apparell, of which I have not already disposed, I give to the College of Physicians all my bookes and papers, and my best Persia long carpet, and my blue satin imbroyedyed cushion, one pair of brass and irons, with fireshovell and tongues of brasse, for the ornament of the meeting room I have erected for that purpose. Item, I give my velvet gowne to my lo. friend, Mr. Doctor Scarburgh, desiring him and my lo. friend, Mr. Doctor Ent, to looke over those scattered remnants of my poore librarie, and what bookes, papers, or rare collections they shall thinke fit to present to the Colledge, and the rest tǒ be sold, and with the money buy better."

Aubrey, who has recorded so many personal facts concerning Harvey, says: "In person he was not tall, but of the lowest stature; round-faced, olivaster complexion, little eyes, round, very black, full of spirits; his hair black as a raven, but quite white twenty years before he died." The best portrait of him extant is by Cornelius Jansen, in the library of the College of Physicians, one of those rescued from the great fire which destroyed their original hall in 1666. It has been often engraved, and is prefixed to the finest edition of his works ever published—that by the college, in quarto, 1766.

Harvey had long been afflicted with gout. On the third day of June, 1657, in the eightieth year of his age, he was suddenly attacked with paralysis, of which he died the same evening, this disease "giving him an easy passport" into eternity.

Thus ended the physical life of this great master. His private life was distinguished by friendship and cheerfulness, amiability and modesty, candor and rectitude, generosity and liberality, charity and magnanimity. His researches and genius have given him an immortal fame and created him a fixed star in the galaxy of illustrious scientists.

It now remains for me to sketch a brief outline of the discovery of the circulation of the blood.

Erasistratus (300–260 B. C.), a Greek physician and anatomist, the grandson of Aristotle, of whose works we possess but a few fragments, which are preserved in the writings of Galen, taught the grave error that arteries, as their name implies, are air-vessels, and that veins are the only true blood-vessels. The sole purpose of respiration was to fill the arteries with air; the air distended the arteries and made them beat—the air caused the pulse. The air, once in the left ventricle of the heart, became the vital spirits. The office of the veins was to convey blood to the extremities. When the veins carried blood only and the arteries were filled with vital spirits, then perfect health was maintained;

but the entrance of blood into the arteries, which he admitted to sometimes occur, was abnormal and the source of disease—fevers when it entered some noble part or into a great artery; inflammations when it was found in the extremities of the arteries.

These errors were taught four hundred years, till Claudius Galen (A. D. 131) proved by experiment that arteries are true blood-vessels. He said when an artery is opened blood alone gushes out and no air. He tied an artery at two places a little distance apart, and on opening the vessel found it filled with blood only. The followers of Erasistratus wanted to know how the air from the lungs entered all parts of the body, to whom Galen replied that the air entered the lungs to cool the blood, after which it was expelled. This theory was held so late as the last century, even by the renowned physiologist Albrecht von Haller. Galen declared the pulse to be the dilatation of the artery by the contraction of the heart, which is the truth.

Galen also taught that there are two kinds of blood—the *spiritual* blood of the arteries and left ventricle, and the *venous* blood of the right ventricle and veins—the red and the black blood.

Thus glimpses of physiological truth slowly evolved. Galen, however, was the author of some grave errors which were stumbling blocks in the pathway of science for many ages. He believed it necessary that a certain portion of spirit should be mixed with the venous blood to render it fit for nutrition, and this he conceived took place by the transmission of arterial blood through little sieve-like holes in the ventricular septum, which he called "foramina." He taught that the arterial blood nourished organs of a light and delicate texture, such as the lungs, while the venous blood supplied the grosser organs, such as the liver.

All the early modern anatomists, accepting Galen as an infallible authority, believed the septum was perforated, and saw the "foramina" with the eyes of faith. Mundinus, who flourished in the fourteenth century, said the septum was perforated, and a score of his successors reiterated it.

Berenger de Carpi, whose work on anatomy was published in 1521, was the first to waver and say that the openings in the septum *were only to be seen with difficulty.* Vesalius, the bold and defiant reformer—the Luther of anatomy—among other errors of Galen which he corrected, set the question of these perforations in the septum forever at rest. He carefully scrutinized it, and declared that absolutely no holes existed in it; and thenceforth anatomists ceased to teach this great error which had been perpetuated fourteen hundred years. And thus it came to pass that a second step was taken towards the discovery of the circulation of the blood.

It has been claimed that Nemesius, who was Bishop of Emissa, a city of Phœnicia, at the latter end of the fourth century, had a little insight of this function. He was not properly a medical writer, though he wrote a treatise on "The Nature of Man," which is still extant. In this we find some vague notions, which were neither comprehended by himself or understood by any who followed him. I copy the words, as translated by Freind, for the benefit of the curious:

> "The motion of the pulse takes its rise from the heart, and chiefly from the left ventricle of it; the artery is with great vehemence dilated and contracted, by a sort of constant harmony and order. While it is dilated, it draws the thinner part of the blood from the next veins, the exhalation or vapor of which blood is made the aliment for the vital spirit. But while it is contracted, it exhales whatever fumes it has through the whole body, and by secret passages. So that the heart throws out whatever is fuliginous, through the mouth and the nose by expiration."

[To be Concluded.]

EDITORIAL DEPARTMENT.

MAC CORMAC ON ANTISEPTIC SURGERY.

To Mr. Mac Cormac belongs the palm for 1880. In this country, especially, where everybody is discussing "Listerism" with such vague fluency, his work is likely to be received with signal approbation.

The service performed is this: Mr. Mac Cormac has presented the arguments of those who uphold and those who criticise Mr. Lister's position, and appended to the discussion a clear exposition of the details of antiseptic surgery as exemplified in the practice of its most distinguished devotees. The manner of his work is praiseworthy in this respect: he gives the opinions of conflicting advocates in their own carefully-chosen words, and throughout the work he subordinates the author to the subject-matter of the book. With the material at hand Mr. Mac Cormac could easily have filled an octavo volume of standard plumpness; but he has done better. In a thin volume of but 280 pages, he has put together just what the busy practitioner wishes to get hold of, and omitted everything else.

The first hundred pages contain the address of Mr. Mac Cormac at St. Thomas's Hospital, one year ago, together with a full report of the discussion which followed and which occupied two evenings. The debaters were Bryant, Macnamara, Barwell, Spencer Wells, Thomas Smith, Timothy Holmes, Lister, John Wood, Sir James Paget, Lund, Dr. Newman, Knowlsley Thornton, Morrant Baker, and Mr. Mac Cormac. The tone of the discussion is admirable—straightforward, trenchant, courteous throughout. Particularly noteworthy is the respectful esteem in which Professor Lister is held by his opponents.

The remainder of the book is comprised in three chapters. The first is a lucid exposition of the "Antiseptic Theory." In it we get the result of Mr. Cheyne's investigations—which are not yet accessible to the ordinary reader. "The germ-theory received rather a rude shock by the experiments of Klebs, Ranke, and others, which appeared to prove that organisms freely develop under antiseptic dressings, and were to be found even in healthy living tissues." "Cheyne seems to have settled by very exact experiments that bacteria and micrococci are different organisms, develop under different conditions and are not interchangeable; that the former are intimately associated with the production of putrefactive change in animal tissue, while the micrococcus is not." "Cheyne never found bacteria under antiseptic dressings, though he discovered micrococci."

Then follows an excellent chapter on "Antiseptic Material." The relative merits of carbolic acid, thymol, salicylic acid, boracic acid, acetate of alumina, and chloride of zinc are fully discussed. The best methods of using them are clearly explained. Carbolic poisoning is described. Detailed directions for preparing the sutures and ligatures, managing the spray, and applying the dressings are carefully wrought out, and illustrated by numerous wood-cuts. The figure of Küster's "antiseptic gauze fabricator" is alone worth the price of the book to a surgeon who is out of reach of the metropolitan shops. (Apropos of Dr. Küster, we had the pleasure of observing that gentleman's practice in the Augusta Hospital, Berlin, for several weeks during the Summer and Autumn of 1876. Among the notable cases were an exsection of the sternum; thoracentesis, with resection of the rib in front and behind, in a feeble old gentleman of seventy; and amputation of both thighs and one arm on a poor fellow who had been crushed by machinery; all of which cases turned out wonderfully under Dr. Küster's rabid Listerism.)

The book concludes with a long and interesting chapter on "Antiseptic Practice." Cases are freely introduced, and many ingenious devices are shown, proving the applicability of antiseptic practice to almost every variety of surgical procedure. Obviously Mr. Mac Cormac's work is destined to be of great service, alike to those who accept and those who reject the doctrine and practice of Professor Lister.

THE CLINIC.

1. **Transverse Fracture Right Tibia.** **L. D. Mason.** Illustration of evils of primary bandage. Patient male. Injury caused by bar of railroad iron; came under observation two days after accident. A bandage had been applied immediately after accident by neighboring practitioner from foot to knee, and over this strips of thin wood were tied closely around limb, and the dressings ordered to be kept wet with vinegar and water. When bandages were removed by Dr. Mason, a superficial line of vesication was found extending spirally around limb in direction corresponding to turns of bandage. Limb placed in pillow and supported by sandbags. Good recovery.

2. **Scirrhus of Breast.** **Prof. Jarvis Wight.** Extirpation. Recovery. Mrs. M., aged 50, domestic. Tumor of breast had existed for several years. Removed by elliptical incision extending to axilla; mamma and all axillary glands within reach removed, the latter also the seat of carcinomatous deposit. Wound dressed with 10 per cent. solution of carbolic acid. Alcoholic stimulants necessary to relieve shock. Highest temperature, on second day after operation (39° C.).

3. **Report of 60 Cases of Hystero-Trachelorraphy.** **Prof. A. J. C. Skene.** In 60 cases of operation for restoration of the cervix uteri after laceration, the following are points of interest: Only one patient was anæsthetized. In all the cases silk sutures were employed and antiseptic marine lint used as dressing. Vaginal douche employed in two cases only; in these there had occurred slight vaginitis following operation. Of the 60 cases, in 55 the results were perfect; there was one complete failure and two partial failures.

4. **Diphtheritic Croup.** **Tracheotomy.** **Dr. H. N. Read.** Secondary hemorrhage seventh day. Recovery. J. W., æt. 5 years, strong and healthy, upon evening of day of attack found to have tonsils and pharynx covered with diphtheritic membrane; cervical glands much swollen; face congested; patient quite drowsy and stupid; temp. 40° C. Made apparently good recovery in 6 days under tr. ferri chlor. and potass. chlor. internally, and solution chloral hydrate in glycerine locally, together with free use of stimulants. On 8th day from first attack symptoms of laryngeal obstruction occurred with recurrence of fever. Tracheotomy on following day. Patient did well till day after operation, when, after violent paroxysm of coughing, alarming venous hemorrhage took place from thyroid plexus, blood escaping from pocket at lower angle of wound in front of the trachea. Bleeding point secured and wound packed with lint soaked in liq. ferri persulph. Good recovery in fourth week after operation.

JOURNALS RECEIVED IN EXCHANGE FOR THE ANNALS OF THE ANATOMICAL AND SURGICAL SOCIETY, 1880.

TRI-WEEKLY.

1. La Gazette des Hôpitaux, 4 rue de l'Odéon, Paris, France.

2. L'Union Médicale, 11 rue Grange-Batelière, Paris, France.

SEMI-WEEKLY.

3. La France Médicale, 19 Boulevard Malesherbes, Paris, France.

WEEKLY.

4. Boston Medical and Surgical Journal, Dr. J. C. Warren, Editor, Boston, Mass.

5. British Medical Journal, Mr. Ernest Hart, Editor, 161A Strand, London, England.

6. Centralblatt für Chirurgie, Prof. E. Richter, Redakteur, Neue Taschenstrasse, 21, Breslau, Germany.

7. Concours Médical, Dr. A. Cezilly, Directeur, 105 Boulevard Saint-Michel, Paris, France.

8. Gazette Médicale de Paris, Redacteur, Dr. F. de Ranse, 4 place Saint-Michel, Paris, France.

9. Lancet and Clinic, Drs. J. C. Culbertson and J. G. Hyndman, Editors, Cincinnati, O.

10. Louisville Medical News, Drs. R. O. Cowling and L. P. Yandell, Editors, Louisville, Ky.

11. Lyon Médical, Dr. J. Icard, 48 rue de la Republique, Lyon, France.

12. Medical Record, Dr. G. F. Shrady, Editor, 27 Great Jones st., New York.

13. Medical and Surgical Reporter, Dr. D. G. Brinton, Editor, Philadelphia, Pa.

14. Nouveau Journal Médical, Directeur, Dr. L. Girerd, 16 rue Grange-Batelière, Paris, France.

15. Progrès Médical, Directeur, Dr. Bourneville, 6 rue des Ecoles, Paris, France.

16. Revue Médicale Française et Étrangère. Directeur, Dr. E. Fournié, 11 rue Louis le Grand, Paris, France.

17. Science, John Michels, Editor, P. O. Box 3838, New York.

18. Scientific American, New York.

19. Scientific American Supplement, New York.

20. Wiener Medizinische Wochenschrift, Wien, Austria.

TRI-MONTHLY.

21. Gazette Médico-chirurgicale de Toulouse, Directeur, Dr. A. Labéda, Toulouse, France.

SEMI-MONTHLY.

22. Anfiteatro Anatomico Espanol, Madrid, Spain.

23. Bulletin General de Thérapeutique Médicale et Chirurgicale, Publié par MM. les professeurs Bouchardat, Leon Le Fort, Potain, 8 place de l'Odéon, Paris, France.

24. Chicago Medical Review, Dr. E. C. Dudley, Editor, 70 Monroe st., Chicago, Ill.

25. Der Militaerarzt, Wien, Austria.

26. Hospitals Tidende. Hoved-Redaktör, C. Lange, Kjöbenhavn, Denmark.

27. Maryland Medical Journal, Dr. T. A. Ashby, Editor, Baltimore, Md.

28. Medical and Surgical Journal, Dr. T. F. Rumbold, Editor, St. Louis, Mo.

29. Michigan Medical News, Dr. J. J. Mulheron, Editor, Detroit, Mich.

30. Philadelphia Medical Times, Dr. H. C. Wood, Editor, Philadelphia, Pa.

MONTHLY.

31. American Practitioner, Drs. D. W. Yandell and Theophilus Parvin, Editors, Louisville, Ky.

32. American Medical Journal, Dr. Geo. C. Pitzer, Editor, St. Louis, Mo.

33. American Journal of Microscopy, 14 Dey st., New York.

34. American Monthly Microscopical Journal, Romyn Hitchcock, Editor, 53 Maiden Lane, New York.

35. American Veterinary Review, Dr. A. Liautard, Editor, 141 W. 54th st., New York.

36. Annales des Maladies de l'Oreille, du Larynx, etc., Direc-

teur, Dr. Ladreit de Lacharrière, 1 rue Bonaparte, Paris, France.

37. Arkansas Medical Monthly, Dr. J. J. Jones, Editor, Little Rock, Ark.

38. Australian Medical Journal, Melbourne, Australia.

39. Bulletin de l'Académie Royale de Médicine de Belgique, Bruxelles, Belgium.

40. Canadian Journal of Medical Science, Dr. U. Ogden, Editor, Toronto, Ont.

41. Canada Medical Record, Dr. F. W. Campbell, Editor, Montreal, Que.

42. Canada Lancet, Toronto, Ont.

43. Chicago Medical Times, Dr. W. H. Davis, Editor. Chicago, Ill.

44. Clinical Record, Dr. W. B. Hazard, Editor, St. Louis, Mo.

45. College and Clinical Record, Drs. R. J. Dunglison and Frank Woodbury, Editors, Philadelphia, Pa.

46. Country Practitioner, Dr. E. P. Townsend, Editor, Beverly, N. J.

47. Courier of Medicine, St. Louis, Mo.

48. Cronica Medico-Quirurgica de la Habana, Habana, Cuba.

49. Dental Cosmos, Philadelphia, Pa.

50. Dental Jairus, Sacramento, Cal.

51. Dental Miscellany, 1260 Broadway, New York.

52. Detroit Lancet, Dr. L. Connor, Editor, Detroit, Mich.

53. Deutsche Zeitschrift für Mikroskopie, Herr Otto Brandt, Holzgartenstrasse, 10, Berlin. Germany.

54. Dublin Journal of Medical Sciences, Fitzwilliam Square, Dublin, Ireland.

55. Gaillard's Medical Journal, Dr. E. S Gaillard, Editor, P. O. Box 1124, New York.

56. Gazette Médicale de Strasbourg, Directeur, Dr. J. Bœckel, Strasbourg, Germany.

57. Hahnemannian Monthly, Philadelphia, Pa.

58. Indiana Medical Reporter, Evansville, Ind.

59. Journal of Chemistry, (Boston), Dr. W. J. Rolfe, Cambridge, Mass.

60. La Escuela de Medicina, Mexico, Mex.

61. London Medical Record, 15 Waterloo Place, London, England.

62. L'Union Médicale du Canada, Montreal, Que.

63. Medical and Surgical Journal, Atlanta. Ga.

64. Medical and Surgical Journal, Buffalo, N. Y.

65. Medical and Surgical Journal, Canada, Montreal, Que.

66. Medical and Surgical Journal, New Orleans, La.

67. Medical and Surgical Journal, Pacific, San Francisco, Cal.

68. Medical Counsellor, Dr. H. R Arndt, Editor, Grand Rapids, Mich.

69. Medical Herald, Dr. D. S. Reynolds, Editor, Louisville, Ky.

70. Medical Journal and Examiner, Drs. N. S. Davis, J. N. Hyde, D. R. Brower, Editors, Chicago, Ill.

71. Medical News, Dr. J. A. Thacker, Editor, Cincinnati, O.

72. Medical News and Abstract, Philadelphia, Pa.

73. Medico-Literary Journal, Mrs. Dr. M. P. Sawtelle, Editor, San Francisco, Cal.

74. Monthly Magazine of Pharmacy, Chemistry, Medicine, etc., 16 Coleman st., London, England.

75. Monthly Index, 10 Spruce st., New York.

76. Nashville Journal of Medicine and Surgery, Dr. C. S. Briggs, Editor, Nashville, Tenn.

77. New York Medical Journal, Dr. F. P. Foster, Editor, New York.

78. New England Medical Gazette, Dr. H. C. Clapp, Editor, Boston, Mass.

79. Obstetric Gazette, Dr. E. B. Stevens, Editor, Lebanon, O.

80. Ohio Medical Recorder, Drs. J. W. Hamilton and J. F. Baldwin, Editors, Columbus, O.

81. Physician and Surgeon, Dr. V. C. Vaughan, Editor, Ann Arbor, Mich.

82. Popular Science Monthly, New York.

83. Revista Medico-Quirurgica, Buenos Ayres, Argentine Republic, South America.

84. Rocky Mountain Medical Review, Dr. A. W. Adams, Editor, Colorado Springs, Col.

85. Sanitarian, Dr. A. N Bell, Editor, 8 Spruce st., New York.

86. Sanitary Record, Ernest Hart, Editor, 15 Waterloo place, London, England.

87. Southern Practitioner, Nashville, Tenn.

88. Southern Medical Record, Atlanta, Ga.

89. Southern Clinic, Richmond, Va.

90. Specialist, Dr. H. J. Hardwicke, Editor, 11 New Burlington st., W.. London, England.

91. Therapeutic Gazette, Drs. Wm. Brodie and C. Junck, Editors, Detroit, Mich.

92. Veterinary Gazette, 409 East 84th st., New York.

93. Virginia Medical Monthly, Dr. L. B. Edwards, Editor, Richmond, Va.

94. Western Lancet, Drs. A. W. Perry and W. H. Mays, Editors, San Francisco, Cal.

BI-MONTHLY.

95. Archives of Medicine, Dr. E. C. Seguin, Editor, 182 Fifth ave., New York.

96. Journal d'Anatomie et de Physiologie, Publié par MM. Ch. Robin et G. Pouchet, Paris, France.

97. Medical Annals of the Albany County Medical Society, Albany, N. Y.

98. Ohio Medical and Surgical Review, Youngstown, O.

QUARTERLY.

99. Alienist and Neurologist, Dr. C. H. Hughes, Editor, St. Louis, Mo.

100. American Journal of Insanity, Dr. John P. Gray, Editor, Utica, N. Y.

101. American Journal of Medical Sciences, Dr. I. Minis Hays, Editor, Philadelphia, Pa.

102. American Journal of Otology, Dr. Clarence J. Blake, Editor, Hotel Berkeley, Boston, Mass.

103. Archives of Comparative Medicine and Surgery, 22 Union Square, New York.

104. Archives of Dermatology, Dr. L. D. Bulkley, Editor, 1 East 33d st., New York.

105. Archives of Laryngology, Dr. L. Elsberg, Editor, 614 Fifth ave., New York.

106. Archives of Otology, Drs. H. Knapp and D. B. St. J. Roosa, Editors, 25 West 24th st., New York.

107. Archives of Ophthalmology, Dr. H. Knapp, Editor, 25 West 24th st., New York.

108. Birmingham Medical Review, Dr. Robert Saundby, Editor, Birmingham, England.

109. Bulletin de la Société Anatomique de Paris, Dr. de Beurmann, Archiviste, 15 rue de l'École de Médicine, Paris, France.

110. Epitome of Medicine and Surgery, 189 Broadway, New York.

111. Homeopathic Journal of Obstetrics, Dr. Henry Minton, Editor, 169 Joralemon st., Brooklyn, N. Y.

112. Illustrirte Vierteljahrsschrift, J. Dalp'sche Buchandlung, Bern, Switzerland.

113. Journal of Nervous and Mental Diseases, Drs J. S. Jewell and H. M. Bannister, Editors, 70 Monroe st., Chicago, Ill.

114. Walsh's Retrospect, Dr. R. Walsh, Editor, Washington, D. C.

SEMI-ANNUAL.

115. Braithwaite's Retrospect, 189 Broadway, New York.

116. Zeitschrift für Klinische Medicine, Herausgeben von Prof. Dr. Fr. Th. Frerichs und Prof. Dr. E. Leyden, Berlin, Germany.

ANNUAL

117. Annales de la Société d'Anatomie Pathologique de Bruxelles, 25 Rue de la Pepinière, Bruxelles, Belgium.

118. Guy's Hospital Reports, Mr. H. G. Howse, Editor, London. England.

119. St. Thomas's Hospital Reports, Dr. John W. Gillespie, London, England.

120. Transactions American Medical Association, Dr. Wm. Lee, Librarian, 2111 Pennsylvania ave., Washington, D. C.

121. Transactions of the College of Physicians, Philadelphia, Pa.

122. Transactions of the Obstetrical Society of London, 53 Berners st., London, England.

123. Transactions of the Edinburgh Obstetrical Society, Charles E. Underhill, M. B., Librarian, Edinburgh, Scotland.

ADDENDUM.

124. North Carolina Medical Journal, Dr. Thomas F. Wood, Editor, Wilmington, N. C.

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ANNALS

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BROOKLYN, N.Y.

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CHARLES JEWETT, M.D.

ASSOCIATED WITH

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G. R. FOWLER, M. D.,
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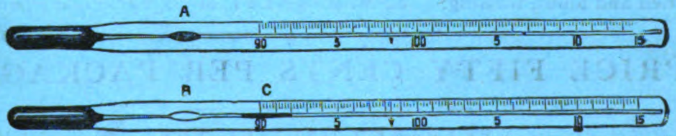

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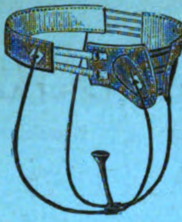

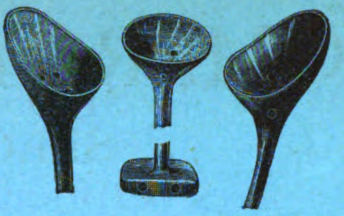

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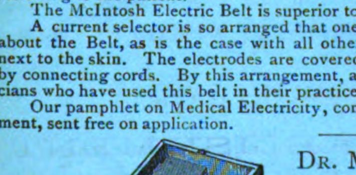

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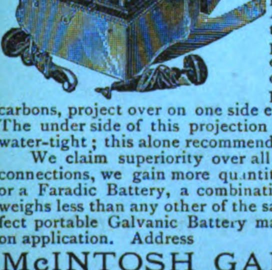

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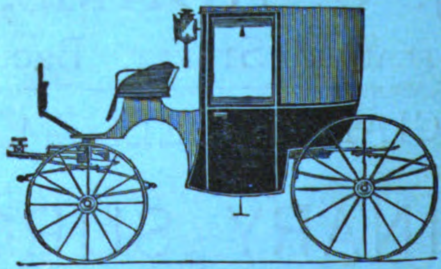

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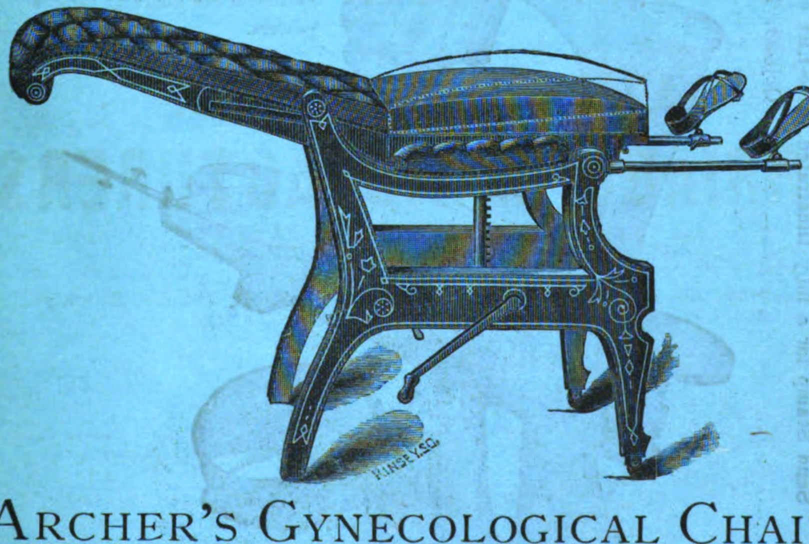

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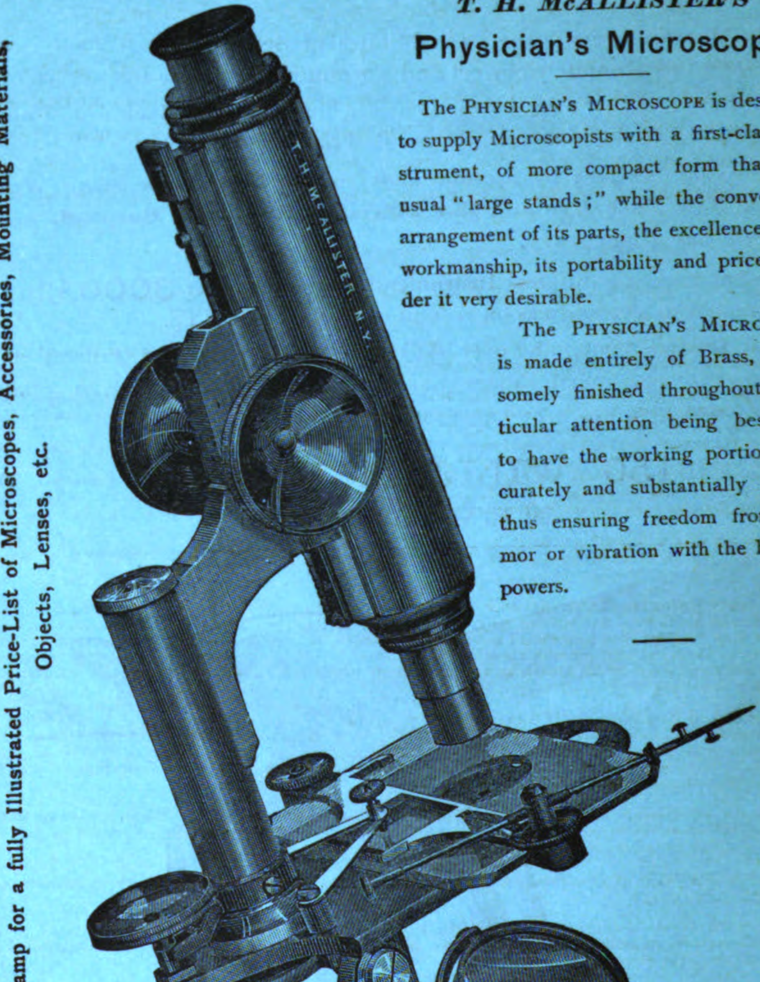
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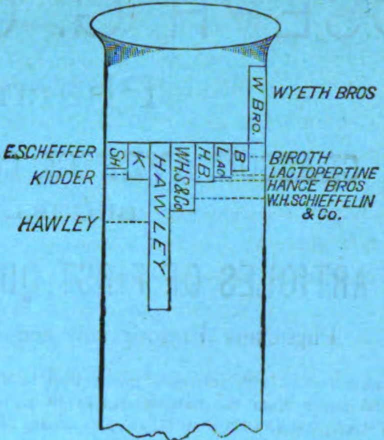

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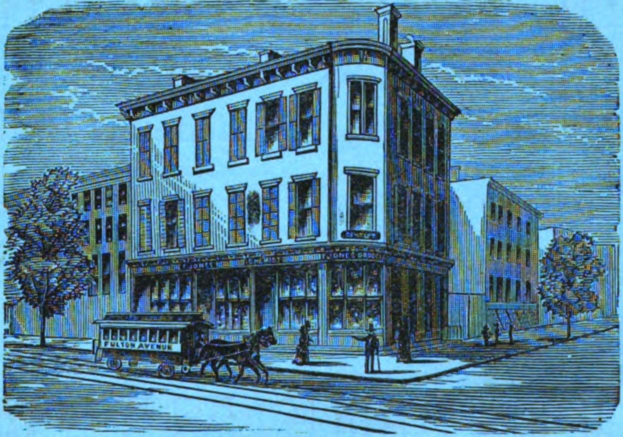

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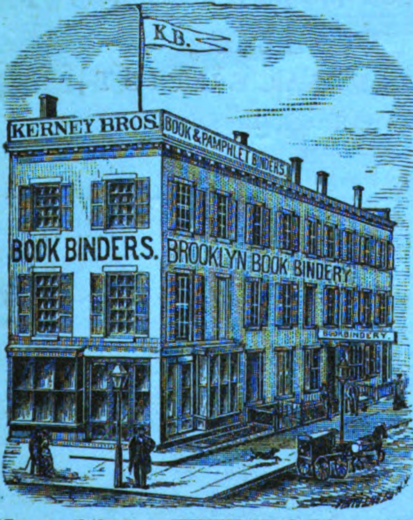
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